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THE FAR EASTERN REVIEW

ENGINEERING FINANCE COMMERCE

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OUR HAT IS OFF TO SILAS STRAWN

JAPAN AND THE INDIAN TARIFF BOARD

YOKOHAMA SPECIE BANK REPORT

HUMANITARIAN TREATMENT OF LABOR IN JAPAN

AMERICAN-JAPANESE INDUSTRIAL CO-OPERATION

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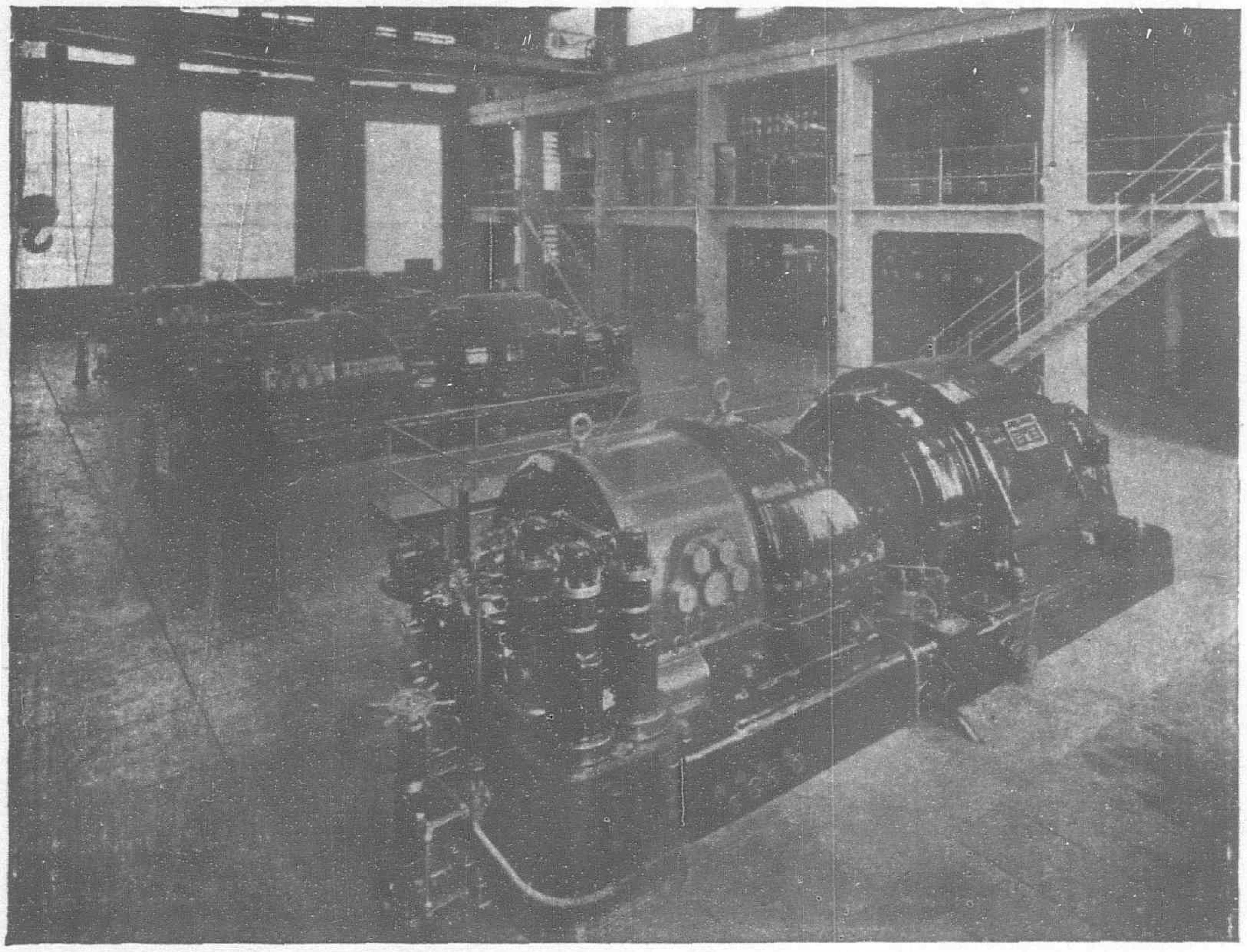

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ENGINEERING FINANCE COMMERCE

VOL. XXII SHANGHAI, DECEMBER, 1926 No. 12

Our Hat Is Off To Silas Strawn!

Why Should Not the Powers Follow a Policy of Realistic Neutrality in China?

MR. Silas Strawn has been making speeches in the United States in which he described conditions in China exactly as they are. He did not make such speeches in China when he was here and therefore he was rather severely criticized by many who wished him well but who were amazed that he should have fallen for the fairy tales of Peking. Apparently they were wrong, or as it can more justly be stated, we were wrong, for the FAR EASTERN REVIEW was among his most severe critics. Mr. Strawn appeared to fall but it was only a stumble. He straightened up and told the story-tellers that he was a man of facts and could deal only with facts. His speeches have exacted from American government officials a left-handed *dementi*, which is all froth, because if the Government sent Mr. Strawn to investigate and he reported, they must either stand by his report or admit that, in so serious a matter, they selected the wrong individual. Furthermore, if Mr. Strawn's report is untrue, what is the truth ? If his facts are straight, what interest has the Government in suppressing them ? Let there be an end to this miserable game of deceit and conceit, this make-believe politics in which nobody dares offend anyone else, particularly when the secondary party in the offense happens to be a vacuum !

Our own little quarrel with Mr. Strawn was based upon his unwillingness to be as realistic in tariff as in legal questions. Of course, when it comes to the law, to politics and the science of government, Mr. Strawn knows what he is doing perhaps better than any half dozen Americans who could be selected for the task. When it comes to tariff questions, Mr. Strawn would naturally be out of his element, for the tariff requires not so much a legal as a business training, and although Mr. Strawn may be classed among financiers, he could not claim a knowledge of the intricacies of the export and import trade in China, which is the only form of commercial or financial enterprise directly affected by China's tariff. Whereas, all the other foreign delegations to the Tariff Conference had business men and representatives of the local chambers of commerce on their staffs, the American delegation had only diplomats, lawyers and so-called professorial experts, who knew the tariff situation theoretically but who had not the remotest idea of trade conditions in China. When American business men in China tried to tell them something, they scented a selfish interest and appeared bored, all of which was nonsensical and stupid and beneath Mr. Strawn's bigness of viewpoint. Some of us in China found it difficult to explain Mr. Strawn's attitude, for it was so unlike his reputation, and we reached the conclusion that the example of Mr. Dawes in Germany affected him to such a degree that he forget himself. If, we have been unjust to Mr. Strawn in this respect, we take off our hat, bow to the ground and wish him a Merry Christmas and a Happy New Year.

His report to his Government on current conditions in China, wipes out all feelings about his attitude on the Tariff question—and besides, the Government allowed him one or two assistants who ought not to be permitted to pester China further with their so-called expertness.

A Policy of Brass Tacks

Now, in admiring Mr. Strawn's courage and bigness in telling the truth about China, we do not join forces with those hard-headed foreigners who want a return to a policy of several generations ago, when the foreigners unloaded a cargo of gunboats in the Yangtze and West Rivers and told China to swallow her gorge or be damned. That sort of policy is the acme of stupidity. We have got to recognize that China is going the way of Japan and that ultimately, perhaps very soon, the foreigners will lose their exceptional position in the country and will have to come down to brass tacks, which means a position of equality with the Chinese. We know that many small foreigners will go under when that day arrives, but on the whole, it will be a fine day for big business because the political impediments to the development of foreign trade will disappear. But we ask the question, Can that day be to-day when there are two governments in China, one in Peking which is only a repository for dead-spirited politicians and the other in Wuchang, which is just beginning the motions of controlling the territory it has conquered by arms and propaganda ? Admitting that all the unilateral treaties are to be altered until they cease to be unilateral, what is the hurry in the face of the civil war and chaotic conditions of the moment ? China has waited eighty-four years for the change. Suppose, it has to wait a full ninety. It makes little difference to China, if, on the part of the Powers, there is sincerity of purpose and a guarantee that they will do nothing to foment disorders to keep the pot boiling.

Let us analyze the political situation in China, as it affects foreign trade :

The Peking Government

There is an emasculated thing in Peking which calls itself the government of the Republic of China and which exists by the grace of foreign recognition. There is no other explanation for its existence. It is selected by no agency of the Chinese people. It sometimes works with one militarist or another. Marshal Chang Tso-lin is reported to have said that it gave him a headache. It is now not even a full government, as few important Chinese will serve on its Cabinet. It has neither President, Parliament nor constitution. It is self-appointed and self-organized. Its political vortex is the personality of Dr. Wellington Koo. More than that cannot be said for it.

The Kuomintang Government

In Wuchang, there is another Government which is organized by the Kuomintang. It came into existence as a result of the military and propagandistic victories of the Kuomintang armies. It controls the provinces of Kuangtung, Kuangsi, Kueichow, Kiangsi, Hupeh and Hunan. Its bridgeheads push into Honan and Szechuan. It is controlled by a political bureau which is selected by the Kuomintang Party with a certain assistance from the Communist Party of China. It is able to dominate mass opinion not only in the provinces under its control but also in what they call enemy territory. Although reports are exceedingly favorable as to the prospects of this government, it is a new institution and cannot yet be called the government of China. Furthermore, to deal with it exclusively and to ignore the so-called government in Peking, would involve the Powers in curious diplomatic breaches which the Powers always seek to avoid. On the other hand, to ignore them lays the ignoring Powers open to an endless assault by the agitational arm of that party. Yet to recognize both these governments would be to divide China into at least two parts, which it is hard to believe either government in China hopes to see done.

Therefore, why not wait? Why should not the Powers follow a realistic policy of protecting their own real interests, which is trade and all that grows out of trade, being friendly to everybody; helping nobody to the detriment of the other party and waiting for unity?

The Ankuochun

Irrespective of these two parties, following a policy altogether of its own, seeking to maintain in China the feudalistic state which is the outgrowth of the decay of Manchu militarism and which has been keeping the country in turmoil for fifteen years. Feudalism is the greatest impediment to trade. One need only study the effect upon commerce of the destruction of feudalism in Europe to draw conclusions as to the evils of the feudal state in China. Now, this state has given itself a new title: it calls itself the Ankuochun, the Army for the Restoration of Peace. In the conflict between the Kuomintang armies and the Ankuochun armies lies the prospect of destruction of the resources and humanity of many provinces and further interference with trade.

Now, the question is: Why should not the Powers wait a while before they decide to back one army or the other. If as many believe, the Kuomintang will be successful ultimately, why not give it a chance to do what it can to unify the country under its own auspices and then deal with it as the Power of the whole of China. Meanwhile, the Powers should cease to support the Peking outfit by letting it have all the customs money, for that is a direct intervention in the affairs of China and is assisting one against the other. *Realistic neutrality!* There is a phrase which means much more than the outworn shibboleth of the old diplomacy in China.

Japanese Mill Enterprise in Bombay

Reprinted from "The Indian Textile Journal."

THE purchase of the Diamond Mills in Bombay by the local Japanese merchants marks a new era in the history of cotton spinning in this country. It will be remembered that Reuter cabled from London a press message to India on the 9th instant that a Japanese Syndicate had purchased a number of cotton mills belonging to an important Bombay group for over £2,000,000. There has been no further detail or confirmation of this message up to this date (October 30th) and Indian financiers and merchants are not inclined to take the news seriously. The Currimbhoy group of mills in Bombay, which have enjoyed a high reputation for efficient management and handsome returns for many years, were believed in some quarters to be the favourites in the estimation of Japanese capitalists, but the suggestion has been treated in the mill circle as a mere feeler or an exaggeration. The purchase of the Currimbhoy group of 12 factories would involve over 2½ crores of rupees, or perhaps more, considering their value and reputation and the returns they have given to the shareholders, and it is doubtful if the Japanese financiers would venture to invest a large capital outlay and take the chance of managing cotton mills in Bombay under the very trying and difficult conditions with which they may not be able to cope. However, the purchase of the Diamond Mills has been confirmed and the year 1926 will, for the first time, include the name of a Japanese firm in the list of millowners in the Town and Island of Bombay.

The Diamond Mill has had a chequered career; it was started in 1890 as the Hope Mill by the late Mr. Rangildas Bhukhandas, an enterprising yarn merchant, who received considerable assistance and guidance at the hands of the late Sir George Cotton, then senior partner in the firm of Messrs. Greaves, Cotton and Co. The concern was purely a spinning factory and the mill yarn made very satisfactory headway in the China market for a long time and the business prospered. Subsequently, however, it came to grief and was sold to Sir Cowasjee Jehangir, Bart., who worked it profitably as the Prospect Mills till the year 1919 when it was transferred for very valuable consideration during the boom period to Messrs. Gulabchand Devchand and Co. The new owners changed the name of the factory to the Diamond Mills with a paid-up capital of Rs. 22,73,500 and 34,550 spindles and 760 looms. Under this agency the Diamond Mills made a profit of Rs. 9,00,000 in 1922 and Rs. 5,00,000 in 1923. It has now been purchased, as already announced, by a Japanese Syndicate, which includes Mr. Anandiram Potdar, cotton broker to the Japan Cotton Trading Co., Ltd. The mill is named the Toyo Podar Cotton Mills, Ltd., with Mr. T. Sasakura, the manager of Messrs. Toyo Menka Kaisha Ltd., as the managing director. Mr. K. Fujimari will be the general manager while Mr. Sadachi, who has just arrived from Japan, will be the technical adviser. Mr. Sadachi is an expert in cotton spinning and weaving and has had considerable experience of cotton mills in his native country.

The Toyo Podar Mill is the first mill in India to be owned and worked by Japanese financiers and merchants and we understand that the machinery in certain departments will have to be replaced and that the mill will be thoroughly renovated before work is restarted. The price of the purchase is said to be Rs. 14,80,000 which is even less than the value of the buildings alone, which latter, is shown at Rs. 17,68,000 in the 1924 balance sheet.

Millowners in Bombay, at any rate, will look forward with some anxiety to the advent of the Japanese manufacturers in the largest center of the textile industry in India, while the local managers and mill experts will be no less concerned at the arrival of the Japanese technical advisers, followed possibly, in course of time, by Japanese managers and overlookers.

The management of Bombay cotton mills with British capital and under the direct supervision of directors and managers from Lancashire has been tried in former years in the case of several mills in this city but without success. The Toyo Podar Mill is therefore a new departure in the management of cotton mills in India, and it has to be seen whether Japanese capitalists will prefer in the near future to compete with India in yarn and cloth manufactured in their own country or as next-door neighbors to the Indian spinners. No doubt there may be millowners in Bombay who would prefer to work alongside a mill owned by the Japanese and worked under the same conditions of labor, hours, climate, etc., instead of under the unfair conditions existing in Japan at the present day and which are now under investigation by the Cotton Textile Tariff Board appointed by the Government of India.

It will be the first time in the existence of the textile industry in India that a cotton mill will be owned by Japanese merchants and worked under Japanese technical advisers and managers, and millowners throughout India will naturally look forward with great interest to the first balance sheet and profit and loss account of the Toyo Podar Mill in Bombay. The Diamond Mill bargain is all in favour of our Japanese friends and does not by any means indicate a cheerful outlook for local millowners and investors who have given their best for the advancement and prosperity of this industry. In 1920-21 cotton mills in Bombay changed hands at fabulous prices; in 1924-25 more than half a dozen have had to be hawked about at the price of the land or building.

This should shorten the work of the Textile Tariff Board in this city and facilitate the drafting of their Report on the condition and prospects of the mill industry in Bombay.

Japan and the Indian Tariff Board

An Important Statement by the Japan Cotton Spinners' Association

This important document bears out Mr. George Bronson Rea's contentions with regard to Bombay Cotton.

Bombay, 19th August, 1926.

THE SECRETARY,
INDIAN TARIFF BOARD
(Cotton Textile Industry Enquiry)
Town Hall, Fort, Bombay.

SIR,—A copy of the representation of the Bombay Mill-owners' Association in connection with the enquiry into the Cotton Textile Industry, together with the questionnaire issued by your Board came to my hands early this month and I have perused it with very great interest. Representing, as I do, the Japan Cotton Spinners' Association, in India, I feel called upon to repudiate the many inaccurate and misleading statements appearing in the Mill-owners' Memorandum, but owing to the impossibility of communicating by mail with my Head Office within the short space of three weeks I feel painfully handicapped in my task. In the absence, therefore, of full information, which I could only obtain after more than two months from my Head-quarters I keenly regret my inability to render such assistance as I should like to offer to the Board in their labours in arriving at a just and equitable solution of the question so far as it relates to what is called "Japanese Competition," and I earnestly solicit their indulgence therefor. Nevertheless, I propose to avail myself of the opportunity to offer a few general remarks on some points raised by the Bombay Mill-owners' Association. I have no desire to criticise Indian labour conditions and labour efficiency, much less to probe the administrative machinery of Indian, especially Bombay, Mills. These are purely domestic matters with which I am not directly concerned. I shall content myself by offering a few remarks on the Japanese Exchange and Labour questions, freight subsidies and the nature and extent of Japanese competition with Indian Mills.

EXCHANGE.—It is sought to be made out in Para 57 and by the Table on Page 17 that depreciated exchange has helped Japan in successfully competing with Indian Mills. The argument is certainly ingenious, and the Table is very cleverly prepared, but it is wholly misleading. It is argued that from middle of 1924 onwards the depreciation of the Yen has helped to reduce the price of Japanese goods, but the whole calculation rests upon the arbitrary fixation of Yen 190 as the manufacturing charges per candy (column 8). This figure is arrived at on the basis of what is called "normal exchange" (*i.e.*, 153). Leaving aside for the present the actual exchange rate from middle of 1924 and onwards, "normal exchange" on the basis of par value (with Sterling @ 1/6d.) should be 134 and on this basis the manufacturing charges work out to Yen 220. But even this figure rests upon the assumption that owing to the superior efficiency of Japanese operatives the manufacturing cost in Japan is 80 per cent. of India. Assuming that Japanese efficiency is 20 per cent. higher than Indian, this would make a small difference in the wages item only of the cost of production; but the Bombay Mill-owners mistakenly reduce the whole cost of production by 20 per cent.—a very serious miscalculation, indeed. It is also conveniently forgotten that if Japanese efficiency is higher, Japanese wages are also fully 60 per cent. higher than in India. Hence the Manufacturing charges should be considerably in excess of Yen 220 per candy. Then, again, whereas the Bombay Mill-owners' Association deem Yen 20 for freight as sufficient to meet shipping expenses both ways, the lowest figure worked out correctly is nearly Yen 30 excluding the commission on both sides. Also, column 7 merely shows the price of Broach Cotton per Candy converted into Yen. To this must be added interest charges for three months on cotton stocks. Japanese Cotton merchants must reckon two months as the time required in which to make delivery of the goods bought in Bombay to the Spinning Companies, for in addition to the usual number of days needed for navigation, there is often the inconvenience of securing bottom, and distribution difficulties are often experienced after the arrival of the goods in the Japanese Ports. Thus, because Japan is far removed from the place of production and the consequent time required for delivery is considerable, the Spinning Companies of Japan are obliged to maintain a certain amount of stock of raw cotton, with which to meet emergencies, and unexpected requirements for mixing purposes. Under such circumstances the Japanese Spinning Companies have to pay interest on money paid for stocks of raw cotton for at least three months—a charge which the Indian Cotton Spinners are not subject to. In the light of these corrections the figures in columns 10 and 11 will vary considerably and it will be apparent that prices of Japanese cloth are comparatively higher than those of Indian.

Proceeding with the argument that the depression in the Indian Mill Industry is due to Japan's depreciated exchange the Bombay Mill-owners' Association come to this happy conclusion in Para 128; "At present the exchange is 129 instead of 153 the normal exchange before the War, and therefore, the protection which ought to be given to the Industry at the present time should be something like 8 per cent. Here again the Mill-owners are harping on the pre-War Exchange rate (namely, 153) quietly ignoring the fact that the Sterling Exchange to-day is 1/6d. and not 1/4d. Japanese Exchange had depreciated to 108 after the Earthquake in Japan but stands at 131 now, or very near par value, with Sterling Exchange at 1/6d. If the Sterling Exchange goes down to 1/4d. Japanese Exchange will be 150. Hence, there is no difference near par between the Sterling and Japanese Exchange and the Bombay Mill-owners' Association cannot, therefore, ask for protection of 8 per cent. against Japan only.

In this connection it may well be pointed out that Japan is the only country manufacturing goods from Indian Cotton and exporting them to India; the other leading manufacturing countries which compete in the Indian market do not buy Indian Cotton. Thus, whereas, in the case of Japan, the benefit of Exchange fluctuations is minimised by the advantage in exports (manufactures) being offset by the disadvantage in imports (Cotton) the other manufacturing countries who only export their manufactures to India secure the full benefit of exchange fluctuations. If, therefore, as is argued by the Bombay Mill-owners' Association, Japan is required to be penalised for the benefit that she derives from exchange fluctuations, then, a fortiori, the other manufacturing countries should be all the more severely penalised. The exchange problem is one that concerns and affects the country as a whole and has to be considered in relation to all the various interests and not specifically for putting a ban on Japanese imports.

The Bombay Mill-owners' Association complain that Government of India's currency policy, namely the closing of Indian Mints in 1893 to the free coinage of silver, ruined India's Yarn trade with China and seriously affected the prosperity of the Bombay Mill Industry. Japanese Mills were precisely in the same predicament when the gold standard was established in Japan (formerly a silver country) in 1898, but they relied on self-help. The adoption of the gold standard completely upset the exchange between Japan and China and the serious financial crisis in Shanghai paralysed the whole business and there was practically no demand for Japanese Yarn. On the other hand, Japan had just emerged from a victorious war which gave an impetus to the cotton industry. And when the crisis came the spinners found themselves in great difficulty with the accumulated stocks produced in the improved and expanded mills. Hereupon the Spinners consulted and discussed to give allowance to encourage export, but could not come to an agreement. As a last means the Association asked Government for bounty, but this was refused. In the spring of 1902 the price of silver began to fall and the rate of exchange on China rose enormously which practically stopped the trade with China. This again placed the Spinners in a very critical situation. The Spinners therefore reduced their working-hours and succeeded this time in persuading the members of the Association to adopt the system of granting allowance on exported goods. The allowance was simply a means of mutual aid instituted among the spinners themselves with their own funds to help themselves over the difficulty caused by the industrial depression.

Double Shift and the Night Employment of Females and Minors:—The Bombay Mill-owners' Association argued that Japanese competition with Indian Mills is unfair because (1) Japanese Mills are allowed to work 2 shifts for 20 hours a day and (2) they are allowed to employ female and child labour at night; and on these grounds they ask for a further protection of 5 per cent. against Japan.

Now, it is as mischievous as it is incorrect to say that Japanese competition is unfair for these reasons, because there is no prohibition whatsoever, even in Japan or India or elsewhere, against double shift*; nor does the employment of female labour at night constitute any breach of international obligations. It is therefore all the more deplorable that offensive statements of the kind should continue to be made by the Association after the very illuminating statement made by the Government of India on the subject and as contained in their vigorous reply No: 341 T. (9) dated Delhi 26th March 1926 (Pages iii to v). Further comment is hardly necessary as Government's reply emphatically states that the Bombay Mill-owners have no basis at all for the case that they have sought to make out against Japan for her non-ratification of the non-employment of female and child labour at night and the Hours Conventions; but let it be noted that India's ratification of these Conventions was neither a new departure in labour legislation nor did it alter the position in the least for the Mill Industry of Bombay, as it is now attempted by the Association to make out, because the Factories Act of 1911 had already prohibited the night employment of women and males under 14 while the Mill-owners had already reduced the hours of work from 12 to 10 of their own accord before the Convention was ratified by the Government. Thus while India can claim no credit for nominally ratifying these conventions the provisions of which had long since obtained in practice under the Factories Act, due credit must be given to Japan for her earnest efforts to "toe the line" as quickly as her peculiar domestic conditions permit; for, it may be pointed out that although Japan has not ratified the Hours Convention, through the good offices of the Japanese Cotton Mill Federation, a "Gentlemen's Agreement" has been arrived at whereby all its members, comprising most of the Cotton Mills of the Country, have adopted 10 hours as the maximum day's work for their employees and a complete stoppage of operation at least 4 days and nights per month. There are a few Mills who do not observe these regulations but they are outside the control of the Federation and moreover their goods do not find their way to India. Thus there is no actual difference in practice between the hours of work in Indian and Japanese Mills.

As regards double shift and night employment of women the system has been brought about in Japan as a sheer necessity. There are various contributory reasons. In the first place, as strikingly disclosed in the Report of the U. S. A. Tariff Commission (1921) the cost of erecting and equipping Mills in Great Britain is 32 dollars per spindle, in America 40, and in Japan 60. The report goes on to say "The amount of investment required per spindle operated has therefore been relatively much higher in Japan than in the U. S. A. . . . . In order to overcome this handicap every effort has been made to obtain the largest possible output from the expensive plant and equipment. This is strikingly evinced by the fact that the Japanese Spinning Mills have been operated night and day." Another reason is provided by Japan's population problem which bears a distinct parallel with pre-War Germany, with this difference that whereas the doors of all countries were open to the German Emigrant they are now shut to the Japanese who must remain at Home and either work or starve; and if there is not sufficient work to go round during the day, then, they must toil at night. This fact is vigorously stated in a very able article contributed to the "Far Eastern Review" by George Bronson Rea. He says "The internal pressure in Japan is yearly growing greater. An outlet must be found, as even by working day and night and creating new industries up to the limit of their financial resources, the Capitalist of Japan can only partially relieve the situation."

Moreover, Japan has to consider the after-effects of hasty labour legislation with special reference to China where Mills are springing up like mushrooms and where labour is exceedingly cheap and no International Labour obligations of any kind exist. With such a formidable competitor in her close neighbourhood Japan cannot be expected to make radical changes all at a stroke. Suffice it to say that she is making sure and steady progress, towards the attainment of the goal fixed by International Labour Standards, as is abundantly evidenced by the enforcement of the revised Factory Act† on and after the 1st July 1926 by an Imperial Ordinance as a consequence of which Japanese Cotton Mills will be prohibited from working at night after the 30th June 1929. India's ratification of the Conventions was merely a nominal act as already pointed out above. It involved no sacrifice, no disturbance in production, organisation or employment. It is therefore no mean achievement for a country like Japan, beset with special handicaps and acute problems of her own, to have made such rapid progress towards the fulfilment of the Conventions adopted at Washington.

It has been pointed out before that double shift employment and night work by females are a sheer necessity at present in view of the pressing population problem. Females are employed instead of males not because of cheaper wages (as is popularly believed) but because male labour is unavailable, being employed in other industries. The Bombay Mill-owners will not recognise this because their objection to female employment at night does not appear to be based so much on humanitarian as on business considerations. They appear to think that double shift system is possible in Japan simply on account of cheap female labour and that is why they are anxious to see the end of employment of females at night. Now let us examine what advantage, if any, Japan derives from double shift and cheap female labour. In the first place, double-shift is confined to the Spinning Section only of the Mills (those controlled by the Federation). Secondly, night efficiency is about 12 to 15 per cent. lower than day efficiency. Thirdly, wastage is considerably greater. Fourthly, as regards the scale of wages which the Bombay Mills-owners consider very low, we may reply in the words of Mr. Mayeda, Chief of the Japanese Delegation to the International Labour Office, "Comparing on the same basis and in the same months of the year, the wages of the Japanese Spinning Operatives, as recorded in the official enquiry of the Labour Office of the Government of Bombay are at least 60 per cent. higher than those paid to the Indian operatives. And if the wages of the female operative only are considered the Japanese wages are more than double the Indian. Generally speaking the wages in Japan have more than trebled while the prices of daily needs have doubled during the last 10 years." As a matter of fact whereas labour wages in Bombay are only 100 per cent. higher than in 1910, in Japan the wages of female spinners have increased 383 per cent. since 1914 and the wages of male labour in the Spinning Department have increased 316 per cent. In the light of these figures the statements made in Para. 129 of the Association's representation are questionable. The saving of 5 per cent. believed to result from double shift working is very doubtful indeed. Mention is also made of reduction in interest charges, but here again the percentage of saving that would accrue in an Indian Mill cannot be obtained in a Japanese Mill for whereas the Bank Rate in India is 4 per cent. it is as high as 7.3 per cent. in Japan since April 1925; And again owing to the necessity of keeping Cotton Stocks for 3 months and the necessity of stocking almost double the quantity of stores (on account of double shift) interest charges on Cotton and Stores run so high that savings under this head would not be anything so big, if at all, as suggested in Para. 129. Let the economic effect of double shift operation be as it may, Japan is committed by Legislation to prohibit night work for women and minors within three years from now, which is by no means a long time; and the slight advantage, if any, enjoyed by Japan by working double shift should be more than offset by the price of raw material (at the very door) and the unequalled facility in marketing their manufactures enjoyed by the Indian Mills.

Subsidised Freight.—Throughout their Memorandum the Bombay Mill-owners' Association has been pleased to refer to Government subsidies and bounty fed freights; but nothing could be further from the truth than the suggestion that the Indo-Japanese service is in any way subsidies or that bounty of any kind or description is granted by the Government to the Steamship Companies. In this connection the Board is referred to the article "Rebate of freight on Indian Cotton " p.p. 2 to 5 of the " Statement concerning the Indian misunderstanding of the Japanese Cotton Industry " (five copies of which are herewith submitted) as also p.p. 21-23 of the same pamphlet issued by the Japan Cotton Spinners' Association. It is an authoritative repudiation of a fiction which has been so persistently set up before the gullible public for consumption that it has almost passed for a half truth.

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*As a matter of fact Bombay Mills tried it and failed owing to scarcity of labour.

†The Japanese Government has already enforced not only the Revised Factory Act which included provisions for workmen's compensation), but also the Labour Disputes Arbitration Act and the Health Insurance Act since July this year.

Burden of Taxation.—The Bombay Mill-owners' Association have a woeful tale to narrate on this head ; but it may be safely said that now the Excise Duty is abolished the sum-total of the other taxes will be much smaller than the tax burden borne by the Japanese Spinners.

The Nature and Extent of Japanese Competition :—The Bombay Mill-owners' Association have been at great pains to show that the present depression is due to Japanese Competition in the Indian market and in the export markets which the Indian Mills used to enjoy. Now, it is true that Japanese goods compete with Indian goods in such export markets as Africa and the Levant (being subject to the same Import Duties there). This competition is exclusively in the class of goods known as Sheetings (or domestics) and made of coarse yarn but there is no competition worth the name in the Home market as what with the 11 per cent. import duty and the abolition of the Excise Duty sheetings have been completely expelled from the Home market, whereas imports of drills and heavy longcloths (12 lbs. qualities) the only other coarse grade Japanese cloths consumed in India—have shrunk by almost 50 per cent. since the abolition of the Excise Duty and they promise to share the same fate as sheeting very soon. There remains, therefore, only one other class of Japanese goods consumed in India, namely, Shirtings and these being made from fine counts yarn of 40's and thereabouts they do not compete so much with Indian production, the great bulk of which is of 24's and under as with foreign goods imported from other Countries—to the benefit of the consumer. Hence, the competition at Home is infinitesimal. The same holds true of the yarn imports also, the competition being almost next to nil. Ever since the imposition of 5 per cent. import duty Yarn imports below 30's have shrunk to infinitesimal dimensions—being about 1 per cent. of the Indian consumption of Yarn. The bulk of the imports are of 40's and upwards, but the Indian production of Yarn above 30's being only 3½ per cent. of the whole production, it will be obvious that Japanese Yarns compete not so much with Indian as with other foreign yarns to the great advantage of the consumer. Any Bazaar merchant will corroborate the truth of those statements.

Para. 21 of the Questionnaire estimates that 70 per cent. of the Imports of piece goods from Japan compete directly with the production of Indian Mills. If the imports of Sheetings into Africa, Arabia, Egypt and the Levant are included in this estimates then, certainly, 70 per cent. is a fairly correct figure, but if by " the imports of piece goods from Japan " is meant the quantity left over for consumption within India itself after deducting the re-exports—then 70 per cent. is an absurdly high figure for the reasons given above.

The whole problem of the quality and quantity of Indian production and the nature and extent of foreign competition was admirably summed up by Mr. B. J. Padshah (of Messrs. Tata Sons, Ltd.) in a valuable contribution to the Press at the time of the last big strike in the Bombay Mills over the question of the reduction of wages. We quote the following passages from it in supporting and illuminating our contentions :—

> The net imports of foreign yarn in 1924-1925 were 55 million pounds against Indian production of 719 million pounds of which 36 million were exported ; the net consumption of Yarn in India was 738 million pounds for the conversion of cloth. At the rate of 4 yards to a pound and 7 pounds of yarn to 8 pounds of cloth, this yarn was converted into 3,374 million yards of cloth, of which 1,970 million yards was manufactured in cotton mills, and 1,400 million yards on hand-looms. The import of cloth was 1,770 million yards, or 60 per cent. of what it was 15 years ago, and only 52 per cent. of the present Indian production. There was an export of 180 million yards and therefore the Indian consumption stood at 4,964 million yards, larger by 250/0 than 15 years ago. Of the 719 million pounds of yarn produced by Mills, only 25 million or 3½ per cent. were above 30's ; of the 55 million pounds of yarn imported 47 million, or 850/0, were above 30's and 8 million were below 30's. Thus imported yarn below 30's was just 1 per cent. of the Indian consumption of yarn. There were thus 72 (=47 plus 25) million pounds of yarn above 30's converted into 329 million yards of cloth. Indian manufactured cloth from coarser counts was thus a trifle above 3,000 million yards. The whole foreign imports of cloth under 30's is apparently much under 180 million yards (or 5 per cent. of Indian production) and is balanced by Indian export of cloth to the extent of 180 million yards. The Indian production of finer cloth is 10 per cent. of the whole Indian production and competes against 1,600 million yards of finer cloth imported, or five times the Indian production of fine cloth. But 25 years ago Indian Mills scorned fine cotton, fine yarn and fine cloth, because the coarser articles paid ever so much better.
>
> Therefore, are foreigners butting in into the Indians' market or Indians butting in into the foreigners' markets? The reduction of foreign imports from 2,800 million yards 15 years ago to only 1,770 million now would seem to point to the latter alternative.
>
> Indian consumption of cloth then has grown 25 per cent. and Indian production in Mills has nearly doubled in these 15 years ; and foreign imports of cloth as a whole diminished by 40 per cent. The whole Japanese import of cloth into India is 155 million yards, or under 5 per cent. of Indian manufacture, and chiefly felt to grow in one special class of goods in which India does not particularly compete and where, even so, Indian manufacture exceeds Japanese imports. Enormous advantages are assigned to Japan for competition in the Indian markets, never did so much bolstering up produce so little result. Are the advantages as real as they look plausible ? Is Japan doing a disservice to our country offering finer and cheaper yarn for Indian looms to work up ? Are foreigners doing this service to be penalised for the protection of Indian incompetence ? "

The following statistics which are compiled from the annual statement of the Sea-Borne Trade of British India 1924 and the report of the Bombay Mill-owners' Association 1924, reveal at a glance the insignificance of the imports from Japan :—

COTTON PIECE GOODS.

(Imports from Great Britain and Japan, and production in India).

	Japan.	% to Total.	Great Britain (Unit 1,000 yards.)	% to Total.	Indian Production.	% to Total.	Total.
1919-1920	75,953	2.8	976,127	36.3	1,639,779	60.9	2,691,859
1920-1921	170,339	5.6	1,291,763	42.4	1,580,849	52.0	3,042,951
1921-1922	90,275	3.3	955,099	34.4	1,731,573	62.3	2,776,947
1922-1923	107,778	3.3	1,453,408	44.2	1,725,284	52.5	3,286,470
1923-1924	122,666	3.9	1,318,804	42.0	1,700,397	54.1	3,141,867
Average ...	—	3.8	—	39.9	—	56.3	—

COTTON YARN.

(Imports from Great Britain and Japan, and production in India).

	Japan.	% to Total.	Great Britain (Unit 1,000 yards.)	% to Total.	Indian Production.	% to. Total	Total.
1919-1920	1,917	0.3	12,229	1.9	635,760	97.8	649,906
1920-1921	20,122	2.9	23,395	3.3	660,002	93.8	703,519
1921-1922	14,915	2.0	40,074	5.3	693,571	92.7	748,560
1922-1923	26,546	3.5	31,018	4.1	705,893	92.4	763,457
1923-1924	20,430	3.1	21,789	3.4	608,627	93.5	650,846
Average ...	—	2.4	—	3.6	—	94.0	—

As however the Bombay Mill-owners are not in a position to deny that Japanese Imports form a very small percentage of the Indian production they have resorted to an argument that is as unconvincing as it is ingenious. They allege that although Japanese Imports are insignificant in quantity the goods are sold at such low prices that the whole of the Indian Textile Industry is forced to sell at unremunerative rates. Now Japanese Imports comprise only Sheetings, Drills and Shirtings whereas Indian production consists of hundred different sorts of goods. Also more than 50 per cent. of the Indian production is made up of dyed, coloured and bleached goods which are in no way affected by Japanese Imports as the corresponding styles are not produced in Japan at all. As regards the balance of 50 per cent. of Grey Goods these also vary immensely both in sorts and dimensions* and barely 20 per cent. of the Indian production comes into direct competition with Japanese Imports. Hence, we can only treat the novel argument of the

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*It should be noted that Japanese Imports are confined to dimensions of 36-in., 38-in. and 44-in. width only whereas Indian Mills produce goods with dimensions ranging almost from 18-in. to 108-in.

Bombay Mill-owners as an insult to the intelligence of the public. It may be incidentally mentioned here that Lancashire Grey Shirtings have been sold at lower rates than Japanese Cloths, especially since the last 8 months or so, and the Association might as well raise the same argument against Lancashire too.

The sale price of Indian Cloth is not determined by Japanese prices as the Association endeavours to make out as the same are invariably higher than Indian prices; as a matter of fact they are determined altogether by internal competition, often of a very unhealthy nature (due to a lack of scientific organisation and co-operation among the Mill-owners themselves) and, not infrequently, by the stress of financial difficulties. It is common knowledge, for example, that throughout the year the financial difficulties of the Managing Agents of a very well-known group of Mills oblige them to make forced sales from time to time. The ruinous effect of such sales on the general level of prices can be better imagined than described and even the best-managed concerns have been hard-hit as a consequence. Normally however, the prices of Standard qualities are fixed from time to time by the sale prices of the most popular mills. Let us suppose that these first-class and well-managed mills sell Grey Shirtings at Re. 1/- per lb. earning thereby a profit of Anna 1/- per lb. This sale at once determines the maximum price realisable by the best Mills. And should the second-class and third-class Mills attempt sales at the same time they generally realise half to one anna per lb. less than the first-class concerns even though the quality is the same. Now, if we remember that the cost of production between first-class and other Mills varies from half to one anna per lb. it will be apparent that whenever the first-class concerns earn one anna per lb. the other concerns will, at best, either make no profit at all or even lose one anna per lb., and it is a frequent complaint with the second-class and third-class mills that the first-class concerns are selling down. Then again, when stocks begin to accumulate in the absence of demand those concerns which are not financially very strong and cannot afford to hold out until demand conditions improve are obliged to force sales at any price and throat-cutting competition sets in amongst these weaker mills. These remarks apply largely to the Bombay Mills which are also suffering rather from up-country mills competition than from Japanese competition. Apart from the advantages which up-country mills (including those in the Native States) enjoy in respect of having the raw material and finished products markets at their very door, they command the advantage of cheaper labour and cheaper and more efficient management—two items which tell very heavily in the case of Bombay Mills. The Board will have ample opportunities of contrasting the administrative machinery of Bombay Concerns with that of up-country mills as also with the system prevailing in the leading manufacturing countries of the world. We shall therefore refrain from developing this very delicate, but none the less most important, theme.

Let us now glance at the Table on page 12 of the Association's representation. The Association have given the loss figures for 1923 to 1925 but the bumper profits made in the 5 years 1918-1922 are not disclosed. If the Bombay Mills had been a little more cautious in the years of excessive prosperity and had carried forward to their Reserve Funds a portion of the large sums that were absolutely frittered away in distributing excessively lavish dividends and in the untimely and ill-advised extension and equipment of expensive machinery and plants—which latter have proved ruinous to even some of the once-flourishing concerns—the Bombay Mill Industry would not have found itself in the present predicament. Cycles of depression follow cycles of prosperity; and if the industry had made the necessary provision for the evil day it would have adjusted itself very soon to the changed conditions after the boom was over. The Bombay Mill-owners, however, were unfortunately caught napping and were completely overwhelmed by the sudden tidal wave of depression. Adjustment has therefore taken them longer time than in other countries and they have unfortunately had to pay dearly for their recklessness during the boom years, but signs are not wanting to show that they have now definitely emerged from the war-time orgies, and, what with the determined efforts now reported to be made to effect improvements and economies in all directions a distinctly bright and promising future is ahead of them. The results of this adjustment, as also of the abolition of the Excise Duty, will begin to tell more effectively after a year or two; and it is our humble opinion that the present inquiry could have been well-deferred for a couple of years because we confidently believe that the Indian Mill Industry will begin to look up as soon as the Mill-owners of the country put their houses in order. We earnestly hope, therefore, that the worthy Members of the Board will arrive at a solution of the problem that will be as just and equitable to Indian as to Importing interests, especially Japanese, against whom such a hue and cry has been raised without rhyme or reason. We are humbly of opinion that a study of the facts and figures would make it highly improbable, if not, impossible, for the Board to come to any unfavourable conclusion about "Japanese Competition" and, therefore, with supreme faith and confidence in their sense of justice and equity, we commend this brief, incomplete and imperfect statement to their most sympathetic consideration.

We have the honour to be,
Sir,
Yours most respectfully,
T. TAMAGAKI, *Agent*,
THE JAPAN COTTON SPINNERS' ASSOCIATION.

American-Japanese Industrial Co-operation

An Address by Mr. K. Yukawa, Director-General of the Sumitomo Firm

AMERICAN reaction to the European anti-war debt campaign is evidenced in the increasing popularity of Japanese securities in the United States. Many American investors are now purchasing Japanese industrial bonds yielding an average of seven per cent and there are indications that further important issues will be floated in the near future. It has taken a long time for Americans to wake up to the opportunities offered for profitable investment in the Far East and now that the pendulem is beginning to swing in this direction, the flow of capital into Japan may become the determining factor in shaping our future Pacific policies. Co-operation with Japan is an established fact and the success attending these joint American-Japanese enterprises is encouraging Japanese bankers and industrialists to turn more and more towards America for the financial assistance that will enable them to solve their problems in a peaceful manner. The extent of these American-Japanese industrial alliances was outlined by Mr. K. Yukawa in a speech welcoming the American Ambassador at a dinner given in his honor by the Japan-American Society at the Osaka Club. On the death of Baron Sumitomo, Mr. Yukawa was elevated to the position of Director General of all the Sumitomo enterprises, and as such is one of the three great captains-of-industry in Japan, a man who has risen from the bottom to the top by sheer ability. Mr. Yukawa chose as the subject of his speech, "Co-operation." He said:

"I do not claim to have any knowledge about political problems, but in so far as the world of business is concerned I think I may perhaps be able to read a sign of the times, if I am allowed to say so, in the 'spirit of co-operation' is now being manifested more and more everywhere in Europe. For instance, even between France and Germany, we see a strong tendency to increase in the number of those entrepreneurs who desire industrial alliances or co-operative undertakings.

"According to a recent press report, some influential business men of England and Germany met in London for friendly discussion of industrial combinations in their countries. On the other hand, we notice that the various leading bankers from Europe and America have lately announced in concert the so-called 'Bankers' Manifesto.' Is this not an evident display of the 'spirit of co-operation' ruling over the business men of the world?

"Some may perhaps say, however, that these are nothing but the counter-measures of Europe against America, but I do not believe so. Why? Because the business men's co-operation after the war was made between Europe and America much earlier than that of the various countries of Europe itself, and is still carried on. If I remember correctly, it was some time in the year before the last that Dr. Harber of Germany came to our country when he told me that the industrial co-operative enterprises between Germany and America were being realised at the rate of, at least, one case per month.

"As far as my personal knowledge goes, the International Standard Electric Corporation, formerly known as the International Western Electric Co., is in co-operation with the peoples in England, France, Italy, and Czecho-Slovakia, for telephone enterprises as well as construction of electric wire and cable works. In other words, the business men's co-operation is now widely carried on not only in Europe, but also throughout the Old and New Continents, America of course being the chief attraction. I have no doubt but that Japan too will eventually follow on the tide of Europe and America inasmuch as the business men in Japan are similarly ardent lovers of peace with a strong hatred for wars having their fervent desires to eliminate, as far as possible, any factors which might cause a war through keen industrial competitions amongst various nations of the world.

Mr. K. YUKAWA
Director-General of the Sumitomo Firm

"So far, we have in Japan, to-day, a fairly good number of instances of Japan-America industrial alliances, among which the name of the Nippon Electric Company, Shibaura Electric Factory, Mitusbishi Electric Company, Tokyo Electric Company, Osaka Electric Bulb Company, and so forth, are specially to be mentioned. In so far as my experience in business is concerned, our Sumitomo Electric Wire and Cable Works entered into a close industrial relationship some years ago with the International Standard Electric Corporation and lately with the Aluminium Company of America, while our Nichi-Beî Sheet Glass Company made a special alliance in industry with the Libbey, Owens Sheet Glass Co., of Detroit. These industrial alliances, which I am personally interested in, are, I am happy to say, showing very satisfactory results of the co-operations.

"The recent introduction of American capital into our industrial circles is very well known by all of us. It is satisfactory to note that this tendency is expected to increase in future, now that financing our industry has resulted, so far, in great successes. It goes without saying that America is our country's most important customer, and that American import to this country is showing an increasing tendency, year after year, so that, viewed from the point of foreign trade, both America and Japan have every reason to strengthen their friendly relationship; especially so, as Japan is the only industrial country in the Far East, and in future there will be no doubt but that the American and Japanese industrial union will increase in various and different shapes and forms.

"If I am hot mistaken in my estimation, I dare say, that in the matter of this important industrial relationship between America and Japan there is one pre-eminent spot on this side of the great ocean which separates the two nations. And that is Osaka, the heart of the industry of Japan! It is a source of our great regret that there are so many Americans who do not *understand* our Osaka. The present visit of his Excellency the American Ambassador to the Kwansai district is therefore a great boon to us. His personal inspection of the conditions of Osaka will surely prove an excellent medium for acquitting his Excellency's citizens at home with the existence of this most important city of commerce and industry.

"Of course, I have a sincere desire that Kyoto and Kobe will also become more familiar to Americans, but those two cities, compared with our own, are already better known among foreigners than their big neighbour, and that is the reason why I have expressed so freely my own wishes about our Osaka.

"Ladies and Gentlemen, I have always cherished an idea that the three cities should be an urban trinity: Kyoto with her beautiful scenery and places of historic interest and with her famous fine arts; Kobe with its very perfect harbour for exports and imports; both being situated within a radius of 20 miles from Osaka. When the proposed arterial roads to connect with these cities are completed, they will be tied together in one long belt of highway.

"The returns for our imports show the fact that the harbours of Osaka and Kobe taken together handle 60 per cent. of the whole imports to Japan while the percentage of exports is 50 per cent. of the total of the whole country. All the members of our Japan-America Society of Kwansai are either the citizens of the trio of cities or at least have their business work and interests in these important places. My earnest wishes are therefore that his Excellency the American Ambassador will kindly consider the trio as one and the same city with his special attention to their relative importance as a city, and that at the same time those American gentlemen in business will come to Osaka, following in his Excellency's footsteps, to get a thorough knowledge of our Osaka, where they may investigate business opportunities, and proceed to Kobe for a close study of the conditions of foreign trades, occasionally going up to Kyoto for rest and pleasure."

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British Trade and Industry

By Gilbert C. Layton, Assistant Editor of "The Economist."

(Special to the "Far Eastern Review")

Electricity Development in Britain

DURING the past year or two much attention has been given to the question of electricity development in Britain. All the same two recent events lend fresh interest to the question. The first is Dr. William Eccles' presidential address before the Institute of Electrical Engineers. The modernisation of basic industries, he said, was impossible without previous electrification on a national scale. He then quoted the figures of the output of electricity per head of population in 1925 from which it is obvious that there is ample scope for electricity development in Britain. In Canada, output was 1,190 units; in Switzerland, 1,070 units; in the United States, 623 units, in France, 248 units; in Italy, 197 units; in Britain, 190 units; in Germany, 185 units; in Holland, 126 units; and in Denmark, 70 units. The British output was less than one-sixth of the Canadian, and only half of the general average for all nine countries. Dr. Eccles expressed the view that one reason for the slow rate of progress in Britain could be found in the high price of electricity; in 1925, the average price obtained per unit sold was 1.9d, compared with 1.53d, in the United States, .72 of a penny in Canada, .60 of a penny in Switzerland, and .4 of a penny in Northern Italy. His remedy for this unsatisfactory state of affairs was centralisation and inter-connection. Both of these principles had been applied during the past five years by the creation of great power zones in Germany, whereas there were only four examples of inter-connection in Britain. The latter, however, were sufficient to prove the advantages of inter-connection, for the undertakings concerned have a load factor of considerably above 40 per cent., as compared with the national average of 28 per cent.

The second event giving renewed interest to electricity development is the report of the Committee appointed by the Electricity Commissioners to advise on domestic supplies. The Committee state that they are greatly impressed with the potential value of electricity in the home for lighting, heating, cooking, ventilating and certain household tasks usually performed by manual labor. In certain districts electricity has been adopted for household uses to a marked degree. Taking only average middle and working class houses, as operated electrically to-day in the more advanced areas, the consumption per house ranges from 100 to 300 units per annum for lighting; but it reaches 1,000 to 3,000 units per annum when electricity is also used for cooking, partial and occasional heating, and certain labor-saving devices. Nevertheless, the Committee consider that there is room for great extension, but, like Dr. Eccles, they emphasise the need for cheapness in the supply of electricity.

Engineering Breakdown Problems

The present is a time in which the word " efficiency " is heard frequently. And doubtless it is right that this should be so, for progress has been defined as the elimination of waste. But, in the engineering world, one aspect of efficiency has been curiously neglected. In other words, due attention has not been paid to breakdowns, although breakdowns result in enormous waste in the course of a year. In part, this defect is remedied by the annual technical reports of the British Engine, Boiler and Electrical Insurance Co. The report for 1925 contains many features of interest. The importance of systematic inspection of boilers and indeed of all apparatus which works under pressure is again emphasised. Special attention is also paid to the question of the proper heat treatment of steels and the conclusion cannot be escaped that there is need for the increased employment of metallurgical engineers.

A notable point made regarding engineering breakdowns is that they can rarely be ascribed to one particular cause. In the majority of cases they are the outcome of a number of small defects, all tending to work the wrong way. Again, stiffness may be misapplied. In one instance the high pressure end of a steam-turbine casing, which was made of cast-iron, had an annular passage-way for the inlet steam projecting round the periphery. Four ribs were run radially from the gland sleeve to this projection. These ribs were redundant, and proved, in fact, to be a source of danger when they started cracking owing to temperature changes. Fortunately the cracks were discovered before they had penetrated into the casing itself, and when the ribs were completely removed no further trouble was experienced.

The British Motor Industry

As a rule, the outstanding event in the British engineering world at this time of the year is the Motor Exhibition at Olympia; and this year's Exhibition is no exception to the rule. It has attracted a great number of visitors and manufacturers have no reason to be dissatisfied with the orders booked. As regards the technical side, while there has been progress it has been by way of improvement rather than by revolution: it has moved along the lines of increased efficiency and greater refinement in performance and appearance. The chief features are the coming of a twelve-cylinder sleeve-valve engined car, of the double-six or V type of engine, the penetration still further into the small car class of the six-cylinder engine, together with the advent of the £100 car. The latter is a noteworthy event, since it is likely to increase the number of motorists. The six-cylinder car is, however, a better pointer to future developments, for quieter running with more flexible engines and reasonable economy in up-keep costs are the best guarantee of continued progress. Quieter running is particularly assured by the increased adoption of the all-steel frame.

Turning to the economic position of the British motor industry, there is little to complain of from the point of view of production. Thus the number of cars produced has risen from 40,000 in 1922 to 133,500 in 1925, the value of the output having advanced from £20,000,000 to £41,566,000 respectively. Moreover, it would appear that the British manufacturer has been gaining on foreign competitors in the home market. Taking the number of private vehicles licensed, in 1922, 49 per cent. represented the products of the home factories and in 1925 the proportion was 69 per cent. There are signs, however, that some ground is being lost in foreign markets, for the total value of exports for the first nine months of this year was £6,363,300 as compared with £6,787,800 for the corresponding period twelve months ago. Further, the finances of many companies are far from satisfactory, capital reconstructions having been the order of the day in some cases, while in others the dividend-paying stage seems very distant.

* * *

New Labor Law in Japan

THE amended factory law and the minimum age of operatives law of Japan became effective on and after July 1. The following brief analysis of these laws, has been transmitted by Ambassador Charles MacVeagh, Tokyo:

The legislation is applicable to factories employing 10 or more operatives or to industries which are considered to be injurious to health. It is provided, however, that 10 classes of work, which are household industries, will be exempted, although the Minister of Home Affairs may specifically apply the law to those factories which employ mechanical prime movers.

The original ordinance enumerated approximately 20 industries which were regarded as injurious to health. The revised ordinance increases this number to about 60.

The employment of minors less than 14 years of age is prohibited, with the exception of minors more than 12 years of age engaged in household industries, together with members of the family of their employers.

Hours of Work Restricted

Effective on July 1, 1929, juveniles less than 16 years of age and female operatives will not be permitted to work more than 11 hours per day, and their employment between the hours of 10 p.m. and 5 a.m. is prohibited. They are to be given two days' holiday in each month, and if engaged six or more hours daily in work are to receive 30 minutes' recess, which is increased to one hour when the working day exceeds 10 hours.

Relief Allowances Increased

The provisions for the granting of relief in the event of the illness, injury, or death of an operative have been considerably improved from the standpoint of the operative. The ordinance now requires the operator to prove to the satisfaction of the local authorities that the illness, injury, or death of an operative did not occur in the performance of his duties; and, at the same time, the allowances which the operator is required to pay have been appreciably increased.

The factory law previously required the payment of 50 per cent. of the workman's wages while recuperating from illness or injury. The employer is now required to pay the entire cost of the medical treatment and 60 per cent. of the wages during a period of six months and thereafter 40 per cent.

In the case of the death of an operative from some cause related to his work, the operator is required to pay to properly designated members of the operative's family a sum equivalent to his wages for 360 days. An allowance for funeral expenses equal to 20 days' wages, or a minimum of 20 yen, is also to be paid to the family of the operative.

A schedule of allowances, varying with the degree of the injury, from 540 days' wages to 180 days' wages, is also to be paid by the operator when an operative is injured.

Protection of Female Operatives—Sanitary Condition

According to detailed regulations issued by the Minister of Home Affairs, under the factory law, female operatives may four weeks or less before childbirth request suspension from work, and they are prohibited from resuming work before six weeks have elapsed since childbirth.

Operatives nursing children less than one year of age are to be given two additional recess periods of 30 minutes each day.

The revised law gives the local authorities additional latitude in ascertaining the sanitary condition of factories employing more than 50 operatives. The operator may be ordered to improve the buildings and equipment for the purpose of guarding the health of the operatives.

The present laws and ordinances were amended in accordance with the provisions of the Washington Labor Convention of 1919.

The Yokohama Specie Bank Annual Report

Chairman Kodama on Trade in Asia

IN an interesting annual report, Mr. K. Kodama, President of the Yokohama Specie Bank, described the trade of Asia during the past year. Mr. Kodama said :—British India has enjoyed good monsoons for the last four years successively, and as a result of these favourable circumstances the financial position of the Government has been greatly improved, so much so that according to the Budget for the current fiscal year, presented on March 1, it is estimated that there will be a surplus of thirty million Rupees, despite the fact that the abolition of the cotton Excise Duty, which has been under consideration for many years, was finally decided upon and came into force during the period under review. In regard to foreign trade, although exports of jute and rice showed as good results as before, those of cotton were indifferent, due to a moderate crop caused by untimely rain, and also to the relatively higher price quoted in India in comparison with that current in the United States for their product. In value, also, cotton exports showed a sharp decrease, as the general market price ruled low during the half-year. Wheat and seeds produced poor crops, owing to the untimely winter rains, and exports of these products were consequently inactive. The total of all exports for the half-year, therefore, due to the causes mentioned, suffered the big reduction of 402 million Rupees, totalling only 1,856 millions. On the other hand, imports of iron and steel materials and sugar were quite good, while cotton piece goods and yarns, which are the most important of India's imports, improved greatly during the last three months, although previous to that trade in these lines had been somewhat inactive. Consequently, the import trade proved in the end to be as good as for the corresponding period last year, the total amounting to 1,191 million Rupees, which, however, leaves exports in excess by 665 million Rupees, though this excess does not compare very favorably with that for the corresponding period last year, which was 1,067 millions. The net imports of gold and silver totalled only 259 million Rupees, a decrease of 284 millions as compared with the first half of the previous year, and the excess exports of merchandise, therefore, were more than the net imports of the precious metals by 400 million Rupees.

As regards money, although the Government, in anticipation of a brisk demand in connection with the export season, provided 90 million Rupees in fresh funds, as a temporary measure, by the issue of new Notes against British Government Bonds, the demand was not as great as was expected, owing to the inactivity in the export trade already referred to. Consequently, the official discount rate of the Imperial Bank of India was never higher than 6 per cent. p.a., and when funds began to return from the interior in April, money became distinctly easy, eventually leading to the rate being reduced to 5 per cent. p.a. on May 22 and to 4 per cent. p.a. on June 10, and with money so easy the funding of maturing loans by the Government was greatly facilitated.

To deal with foreign exchanges, the rate on London may be taken as a typical one, and this kept steady with $1/6\frac{3}{16}$ as the highest even at the time when the export trade was in full swing, and this state of affairs must no doubt be attributed to the successful working of the Government's scheme for the stabilization of the currency, put into operation last Autumn. An easier tone became noticeable after February, however, when export bills on the market began to get scarcer, and by the end of March under 1/6 was being quoted, Calcutta even reporting as low as $1/5\frac{11}{16}$ as the quotation there at the beginning of April. On April 8, however, the Government made a declaration to the effect that they were willing to sell T.Ts on London at $1/5\frac{3}{4}$, to an unlimited extent, through the Imperial Bank of India, and thereafter the rate took an upward turn, being quoted at $1/5\frac{29}{32}$ at the close of the period.

Trade with Japan amounted to Y.82,200,000 in imports from, as against Y.284,500,000 in exports to, this country, or a decrease of Y.77,000,000 in the latter and practically no change in the former as compared with the figures for the corresponding period in the previous year. These results are explained as regards imports by the fact that the increase in cotton goods covered the decrease in sundry goods, while as regards exports, cotton, jute and gunny bags all showed decreases, the reduction in the value of cotton exports alone amounting to the conspicuous sum of Y.64,000,000.

South Seas

Turning our attention to the South Seas, and first of all to the Straits Settlements, the price of rubber, one of the most important products in that quarter, which had been on the downward path since the beginning of December last, continued to fall, but, in spite of this, the value of the rubber exported during the period was more than double that for the corresponding six months last year, this being accounted for by the tremendous increase in the quantity exported. Tin, another most important product, maintained the active market in evidence at the close of last year, while copra fared not at all badly. The general export condition being very good contributed in turn to an active import trade, so that exports and imports both showed better results than those for the corresponding period last year, the respective comparative increases being 50 per cent. and 28 per cent. As regards money, there was a constant return to the financial centers of the funds sent into the interior during the previous half-year, when the Government had found it necessary to provide new money by an extra issue of Notes, owing to the stringency then prevailing on account of the high price of rubber, and this steady inflow of funds made money very easy as time went on and eventually affected exchange. For instance, the sterling rate, which commenced the period at $2/4\frac{3}{16}$, fell gradually to $2/3\frac{3}{4}$ at the close, while the rate on Japan, besides being affected by the fall in the sterling rate, was also influenced by the rise in the Japan-America rate, and as a result had fallen to Y.$119\frac{1}{2}$ by the end of the half-year as against Y.$130\frac{1}{4}$ at the beginning. The trade of the Straits Settlements with Japan or the period under review resulted in exports from and imports to the former amounting to 21 million Yen and 23 million Yen respectively, rubber and tin taking pride of place among the exports and cotton goods among the imports.

In Java, despite the good progress made by the Government in the work of adjusting finances, a deficit of 57 million Guilders had to be allowed for in the budget for the new fiscal year, commencing in July, and, consequently, the anticipated reduction in postage and income tax could not be made. On the contrary, the Local Government of Western Java even went so far as to propose and successfully pass a law to impose a 10 per cent. local surtax on the income tax, and so financial circles can not be said to have been altogether free from pressure by the Government. In addition, sugar, the most important product, was very late as the result of unseasonable weather conditions, and the influence of these various circumstances was such that the general business activity of the previous half-year entirely disappeared. Imports in particular suffered from the very heavy overstocking in the face of poor sales, traders having been misled by the good business done in the period before, and as, in addition, there was no sign this year of the large demand for imported goods which usually takes place in April in connection with the Native New Year, the market can only be said to have been generally quiet and dull. Batavia exchange on London ruled steady at slightly over 12 Guilders from the beginning to the end, as the fall which usually takes place with the appearance of sugar bills on the market after May did not occur this time, owing to sugar being late this season. The rate on Japan rose gradually as the value of the Yen improved, and finally reached 115 Guilders as against 106 at the commencement. The trade in Japanese goods in Java was in a depressed condition generally, in marked contrast to the very active market for these goods that existed there in the previous half-year. Cotton piece goods in particular were placed in a most difficult position as the result of the overstocking already referred to, while porcelain and earthenware likewise suffered, their position being rendered even worse by the keen competition of German goods of a similar nature, but our cups and saucers defied competition and practically monopolized the market.

Indo-China

In Indo-China, the movement of Saigon rice was very good during the first three months, but later became irregular, placing the market in a most disadvantageous and uncertain position. The bad rice harvest in China proper, however, led to a very good demand from Shanghai for the Saigon product, while purchases for European delivery were not at all bad, and, in addition, exports to Canton and Hongkong, which had been suspended for some time, were resumed, even if only on a small scale. On the whole, therefore, trade in this particular commodity enjoyed activity during the period, the total quantity exported reaching the quite good figure of 850,000 tons, and as exports of rubber and copra were also good, the result was that the purchasing capacity of the people in the interior and the sales of imported goods both greatly improved. There was, however, some falling off in sales towards the close of the half-year, and a certain sluggishness in import transactions became apparent.

In the Philippine Islands, the prices of their most important products, sugar and hemp, fell more than 10 per cent. below those prevailing in the previous half-year, and the purchasing power of the farmers was naturally reduced in consequence. Moreover, prolonged heavy rains during May and June disturbed communications between the commercial centers and the interior, and greatly interfered with the sale and distribution of imported goods. As a result of these conditions, therefore, both the export and import trades were inactive in general, but as regards trade with Japan, exports from and imports to the Philippines amounted to Y.9,615,000 and Y.15,370,000 respectively, or increases of 37 per cent. and 10 per cent. as compared with the corresponding period last year.

Taking a glance at Australia, the wool auctions disclosed France as a very brisk buyer, and with Great Britain, Japan and Germany also continuing to give fairly good support, a considerable portion of the 1,330,000 bales allotted for auctioning during the period had been disposed of by the end of April at a similar price to that obtained last year, and only 30,000 bales of the allotment remained unsold at the close of the half-year. Moreover, except for a part of Queensland, the rainfall in general was seasonable, so that confidence became strong that the returns for agricultural and pastoral products would be better than ordinary in the coming half-year. Sales of imported goods were therefore fairly active, and imports were not seriously affected even by the partial strike of labor at the beginning of May, so that the period may be said to have passed almost uneventfully so far as this trade is concerned. Australia's trade with Japan during the half-year amounted to Y.82,820,000 and Y.21,800,000 in exports and imports, respectively, from and to the former, wool being the principal exports, while of the imports, silk piece goods and cotton sheetings fared as well as before, but practically no business could be done in cotton drill on account of the high tariff wall.

China

Turning to our neighbor, China, that country was still in a state of constant disturbance, due principally to the differences between the Nationalists on the one hand and the allied war-lords of Chihli and Shantung on the other, whose armies, after facing one another for some time in the neighborhood of Tientsin, eventually proceeded to Peking, which came under the cross-fire of the contending forces. These hostilities threw communications in Northern China into great disorder and seriously hampered the transportation of goods, and consequently business in Chihli and Shantung, of which Tientsin and Tsingtau are the respective trade centers, suffered very considerably during the half-year, both as regards exports and imports. Central China was not, however, concerned in the hostilities, and as Shanghai, its trade center, is far removed from the war zone, business there was little interfered with by the trouble in the north, and both exports and imports through that port were fairly active. Of the exports through that port, the principal were raw silk from the Shanghai hinterland amounting to 84,000 bales of the value of 55 million Taels, or increases of 45 per cent. and 65 per cent. respectively as compared with the figures for the corresponding period last year, Canton raw silk to the extent of 10,000 bales, and green and black teas to the not altogether bad total value of 10 million Taels. Of the imports, sugar, wheat, flour, cotton, cotton goods, woollen goods, machinery and hardware all showed increases, especially wheat and flour, China having had a bad wheat crop last year. As regards money conditions in Shanghai, what with the constant arrival of silver and the smaller efflux of funds to the interior, due to the disturbances prevailing there, a steady increase in the stock of silver became noticeable, the closing figures being Tls. 70,525,000 in silver bars and sycee and $57,741,000 in coin, as against Tls. 46,050,000 for the former and $62,700,000 for the latter at the beginning of the half-year. The market was therefore, in a very comfortable condition generally speaking, a plethora of money being available. In regard to exchange, the rate on London at Shanghai, to take this exchange as an example, which stood at $3/1\frac{7}{16}$ at the commencement, the highest during the period, had fallen to its lowest, $2/10\frac{1}{8}$, by the end of April, and ultimately closed at $2/11\frac{1}{2}$. China's trade with Japan for the half-year totalled Y.228,000,000 and Y.125,000,000 in imports from and exports to the latter country respectively, showing increases of 24 per cent. in the former and 18 per cent. in the latter as compared with the corresponding period in the previous year. To analyse roughly the imports and exports, the principal items of the former were cotton yarns and piece goods, sugar, coal and marine products, and of the latter, raw cotton, eggs, rapeseed, rapeseed cakes and beans.

At Hongkong, the economic blockade by Canton still continued in operation, and trade there must have suffered very considerably in consequence, though to what exact extent it is impossible to say, since no authentic figures are available, owing to the closure of the Harbor Office from October last. The state of depression that prevailed there may, however, be gauged by the exceptional number of failures of Chinese merchants that occurred there during the period, and it appears that trade must have been in a very sluggish condition throughout. As regards money, except for the stringency that always occurs immediately before the Chinese New Year, the market was generally easy and quiet, one reason being that the balance of the £3,000,000 relief fund, which amounted to £2,700,000, was rapidly advanced in loans at the beginning of the half-year, and another, that the commercial demand for money was very much below the normal, due to the depressed condition of trade. Exports from Japan to Hongkong during the period amounted to Y.24,800,000, a decrease of Y.18,000,000 as compared with the first half of last year, while imports from Hongkong to Japan amounted to only Y.345,000, or, on the same comparison, merely 39 per cent. of those for that half-year.

Finally, to turn to Manchuria, the exports of agricultural produce, of which there was a good harvest last year, increased from the beginning of the period, while the work of readjustment and the reform of banking institutions, such as the reduction in the capital of the Seiriu Bank and the Manshu Bank and the reorganization of the Dairen Koshin Bank, were successfully proceeded with. Consequently, economic circles, which for so long in the past had been in a depressed state, began to show an appearance of liveliness. Fengtien Notes, however, sharply depreciated when the financial difficulties of the local Government began to multiply, as they rapidly did after February. In addition, rain during the sowing season was not at all favorable, and misgiving as to the possibility of a bad harvest this year became increasingly evident. Things became very bad, therefore, during the latter part of the period, this condition being further promoted by such unwelcome occurrences as failures to deliver goods imported under contract and difficulties in the collection of the proceeds of sales, which, unfortunately, were constantly happening. New business in imports became practically impossible, therefore, while exports of the chief Manchurian products were seriously hampered by the fall of the Fengtien Note. In short, the latter half of the period experienced depression, as against the slight activity shown earlier on. In the Harbin district, however, the movement of the chief crops was generally good and business in them brisk, and as a consequence there was a liveliness in that part rarely seen of late years. Nevertheless, despite this activity, the prices realized by the farmers hardly came up to expectations, and it can not be said that the result was as good for them as the volume of business appeared to justify. Hence new business in imported goods had to be held in abeyance, though this no doubt served the useful purpose of helping towards reduction of old stocks. Japan's trade with Kwantung Province during the half-year amounted to Y.53,220,000 and Y.111,000,000 in exports to and imports from the latter respectively, showing a relative increase of 16 per cent. in the former and a decrease of 12 per cent. in the latter as compared with the corresponding figures last year.

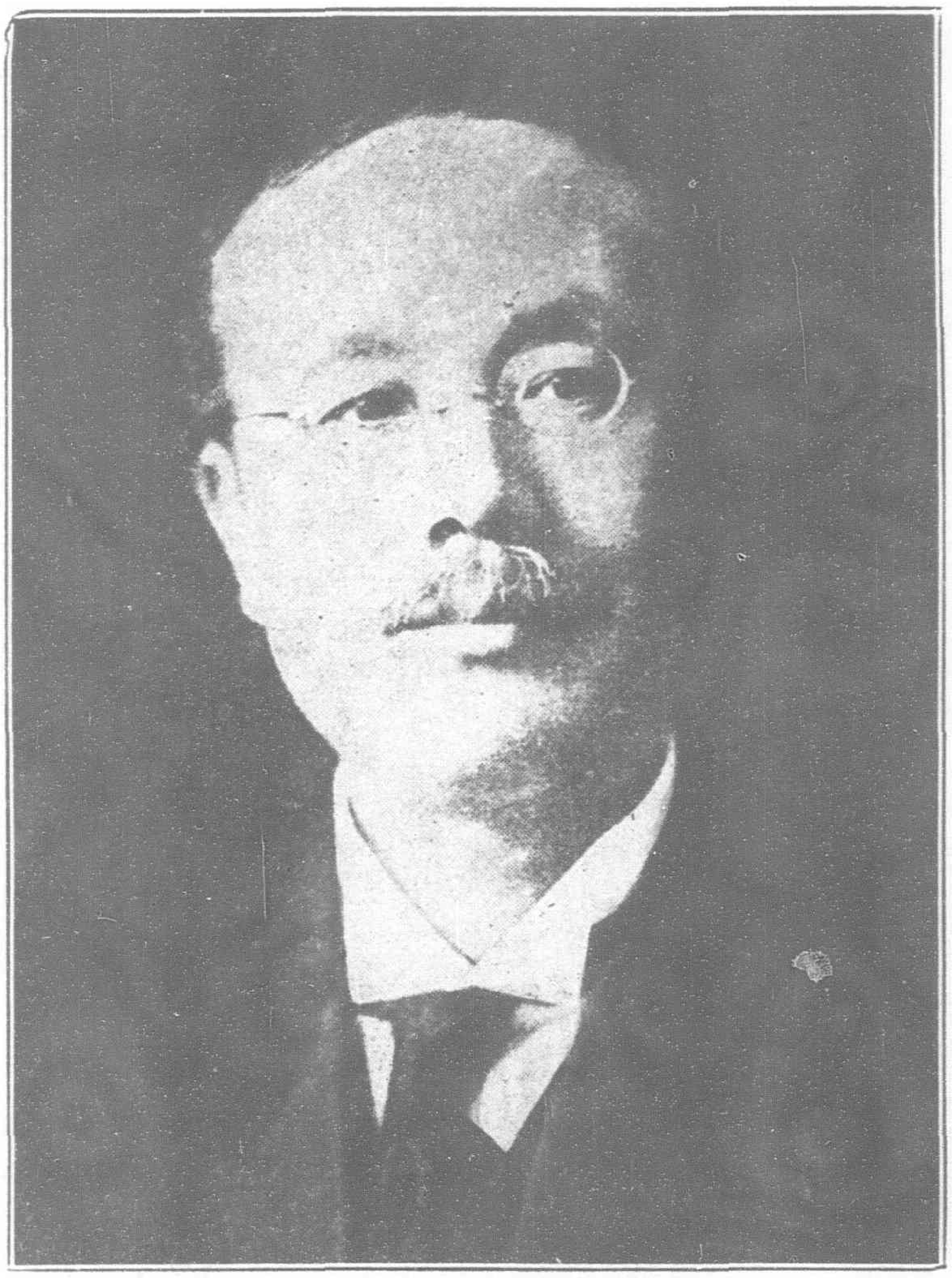
Humanitarian Treatment of Labor in Japan[*]

By Burton Crane,

Commercial Editor, "The Japan Advertiser," Tokyo

TWENTY years ago the Kanegafuchi Spinning Company was on the verge of bankruptcy. Its debts were heavy. Japan had had several lean years and the cotton export market was in poor shape. The case seemed hopeless, so a "young man with ideas" was given a chance to show what he could do.

Since he was given his chance, Mr. Sanji Muto, who smiles and waves a protesting hand when he is called the "Henry Ford of Japan," has brought the company to an astonishing state of development and prosperity. It is now the largest manufacturing company in the Empire, has 17 cotton spinning and weaving plants in addition to numerous silk filatures and rayon factories, and for eight successive half-year terms, commencing with the first half of 1918, paid dividends at the rate of 70 per cent a year. Kanebo, as the Kanegafuchi company is known familiarly in financial circles, has 522,788 cotton spindles, 10.65 per cent of the total number in the Empire; 8,205 cotton looms, 12.5 per cent of the nation's total, and employs 26,563 male and female operatives in its cotton enterprises.



The Hon. Sanji Muto, M.P.

But the most remarkable fact about this remarkable man and his great company is that, in the 20 years in which he has been at the helm, Kanebo has never had an hour of labor trouble. This record was established in spite of the seven-day week, with two eleven and a half-hour shifts, which is the rule in Japan's cotton plants, in spite of the ever-growing class consciousness of the workers, which has cropped out in strikes without number in other factories, and in spite of the average wage of Y.1.40 per day for women and Y.2.00 per day for men (66 cents and 95 cents) which he now pays.

Sanji Muto believes in free speech in industry and around this principle his success has been built. No executive in any Kanegafuchi plant must ever be too busy to talk things over with his subordinates. There must be no officious underlings guarding his door. It must be open always and a cordial welcome must be beyond it. No Kanebo employee has ever been discharged for "kicking to the boss." It is his right to do so and that right is carefully preserved.

In every Kanegafuchi plant there are two locked boxes for suggestions and complaints. One is addressed to the plant manager, who opens it and deals with its contents at weekly intervals. The persons affected, including the complainant, if he be such, are summoned and the situation thrashed out. If there is an abuse or a condition which lies in the power of the plant manager to remedy, he does so. The other box is addressed to President Muto himself and only he may open it. In case he is unable to come from the head office at Hyogo to do so, the box is sent to him, opened and returned. If any employee wishes to speak to him upon one of his periodic visits, he may do so. If the case is acute, the company may even undertake to send him to Hyogo to interview the President. But such cases are rare. Continual free speech and the manifest willingness of the company to "make things right," over a period of 20 years, have eliminated most of the possible sources of friction. Wages are as high as in any similar mill of Japan. Working hours are no longer. Conditions, generally speaking, are vastly better. There are no smouldering fires in Kanebo. But let us take a look at the most successful practical idealist in Japan.

Sanji Muto was born in 1867 in Gifu Prefecture, about midway between Tokyo and Osaka, in the heart of Japan's great silk district. He was the son of Kunizaburo Sakuma, a former member of the Diet. In accordance with a custom which has prevailed in the country from time immemorial, young Sanji was adopted into the Muto family, which was connected with his own, there being no male heir to carry out the line. (Because of this custom, families never die out in Japan. It is understood that Prince Kunihide Kuni, 17-year-old brother of the Crown Princess, is shortly to be adopted in like manner).

In 1885 Sanji Muto was graduated from the Keio Gijuku, the forerunner of the present Keio University, and departed for a two-year trip to the United States, where he was an earnest student of banking and business methods. Upon his return he was successful in the competitive examinations for a position with the Mitsui Bank and remained with the concern for ten years, winning considerable commendation for his executive ability. At the end of this period he was transferred to another of the many interests of the great Mitsui family, this time the Mitsui Bussan Kaisha, perhaps the largest of the importing and exporting companies of the Empire. He was made superintendent of the cotton yarn department.

It was at about this time, 1905, when the Kanegafuchi Spinning Company was on the point of foreclosure, that Heizaemon Hibiya, president and founder of the firm, offered Mr. Muto a position as manager of the Hyogo branch. He accepted, to become managing director a year later. A few years later Mr. Hibiya died and Mr. Muto became president.

Mr. Muto is a political as well as a business leader, being a member of the House of Representatives in the Imperial Diet and the founder and leader of the Jitsugyo-Doshikai, or Businessmen and Industrialists' Party, which he formed in 1921. It now has nine seats in the Lower House, but through a coalition with the Seiyuhonto, one of the three largest groups, is expected to greatly increase its influence in the next general elections.

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[*] Cotton.

Mr Muto represented Japanese capitalists at the first labor conference of the League of Nations in Geneva and was given the decoration of the Blue Ribbon by the Japanese Government in 1911 for meritorious services in connection with the development of the nation's cotton spinning industry.

One of his most recent accomplishments was the authorship of The Book of Business, or "Jitsugyo Tokuhon," which appeared from his pen last year. It is already in wide use as a textbook in the commercial and industrial schools of Tokyo and other cities and has been highly recommended by the Department of Education. This work has solidified his reputation with the younger generation as the most worthy model in the present dynasty of Japanese business.

An admirer of Henry Ford, Andrew Carnegie and Lord Salisbury, Mr. Muto has adopted methods and policies from all three. Lord Salisbury's motto: "Politics is business," is now the motto also of Mr. Muto's party. The book, however, holds Japanese business methods and ethics up to a searching examination, asserting that the nation needs a higher conception of honor to stand as an equal in international commercial morals and a more efficient and progressive attitude toward the solution of production problems.

In point of actual payroll in the middle of April, the Tokyo main plant of the Kanegafuchi Spinning Company is at present the most important of all the company's mills, in spite of the fact that the Hyogo, Sumoto, Okayama and Osaka factories outranked it in both cloth and yarn production last year and several other plants exceeded it in one of the two. Japan has not yet recovered from the effects of the panic of 1920 and the subsequent earthquake in 1923. Reconstruction of the Tokyo plant was only completed last year. Business has been consistently poor and production tables, such as appear herewith, accordingly mirror the fluctuations of the market. Figures on spindles, looms and employees are those of April, 1926, while production data are for the year of 1925.

	Cotton Spindles	Cotton Looms	Male and female Operatives	Annual production of Cotton Year in lbs.	Annual production of Cotton Cloth in yards
Tokyo Mill	75,200	762	4,326	4,509,480	6,665,323
Hyogo Mill	95,600	1,469	4,179	9,028,560	29,753,761
Judo Mill	10,752	no loom	553	4,079,000	—
Nakajima Mill	19,184	,,	987	7,296,040	—
Sumoto Mill	70,352	1,589	3,788	8,950,720	35,784,100
Miike Mill	31,104	no loom	1,372	8,334,680	—
Kurume Mill	15,872	,,	743	4,105,640	—
Kumamoto Mill ...	12,368	,,	366	1,574,840	—
Nakatsu Mill	10,752	352	843	2,628,760	8,959,694
Hakata Mill	12,032	411	974	2,125,720	10,402,483
Takasago Mill	37,440	no loom	1,691	11,104,880	—
Okayama Mill	14,528	982	1,466	5,159,720	22,339,415
Bizen Mill	44,284	no loom	1,399	5,206,000	—
Saidaiji Mill	10,944	669	757	2,413,160	10,883,470
Wakayama Mill ...	11,520	no loom	512	3,837,160	—
Osaka Mill	35,096	1,971	1,991	5,182,560	24,449,994
Matsuzaka Mill	15,860	no loom	616	2,281,920	—
Total	522,788	8,205	26,563	87,818,840	149,238,240

Early in April I informed Mr. Muto that COTTON wished an article regarding his extensive enterprises and received in reply an invitation to visit the Tokyo plant, with the assurance that I might have the rare privilege of taking photographs and securing any other information which the magazine might desire. About the middle of the month I availed myself of this invitation.

The accompanying table above gives some idea of the size of the plant, which, by the way, covers 150 acres, but can give no adequate picture of the plant itself. Of the 4,326 workers, 3,000, all girls, live in dormitories on the company's property. The buildings, nearly all of which reached completion some time last year, their predecessors having been wiped out in the earthquake of 1923, are mostly of modern factory construction, one story in height, with saw-toothed roofs. In the center of the factory group is the power house, equipped with two 4,000 kw. General Electric turbo-generators, kept going with a battery of five British boilers equipped with automatic stokers. Only one generator is operated at a time, the other being kept in reserve, and at the time of my visit the meter registered 2,250 kw. Until this year this power was supplied by the Tokyo Electric Light Company.

With the exception of the looms, about a third of which are American, the other machinery in the plant is of British manufacture, by Lord, Platt, Shaw and Joseph Stubbs. Speaking of the American looms, Stafford automatics, our guide remarked that they were more efficient than their British cousins (Platt) across the aisle and probably would be used in future replacements.

Writing for textile men, it seems hardly necessary that I should describe the processes in use at the Kanebo mill in Tokyo, except to say that materials are routed through it in the shape of a half-moon having both horns on the water-front of Tokyo Bay. The company makes no attempt to sell its products in the export market, leaving this detail to exporters such as Mitsui Bussan Kaisha and Suzuki, but all its raw cotton must come by water and a large portion of its sales are transferred to steamers by lighters for direct export, eliminating extra handling.

In going through the mill the most noticeable feature was its immaculate cleanliness. In some parts it seemed almost a shame to walk about with shoes. In the dormitories, as a matter of fact, my translator and I were provided with rubber-soled foot-coverings, such as are used in private Japanese homes. These dormitories are probably the nearest approach to a home which the girl operatives could find in the city. The majority of these girls come from the country district miles away from the centers of population, where the farmer's international propensity for raising more children than he knows what to do with is more than evident. With more mouths to feed than he can keep chewing, he sends his daughter to the cities looking for work. If she is a sensible girl she generally signs up for a couple of years with a concern such as Kanebo, where she is able to live on the premises, send money home at regular intervals and save considerable.

The dormitories are two-story buildings surrounding courts which, at the time of my visit, were brilliant masses of cherry blossoms. Tasteful pictures in both the foreign and Japanese schools of art hung on the corridor walls. The rooms themselves about 20 feet square, were bright and airy, with flowers in the windows. Lockers stood at either side and the floor was covered with "tatami," which are straw mats about three inches thick, used for the floor of every Japanese-style Japanese house. On them the nation is born, eats, sleeps, marries and dies. At night a Japanese merely pulls two or three "futon," which are somewhat like feather beds America used to use before the alarm clock was invented, out of a cupboard, rolls up in them and drops off to sleep.

Sanitary arrangements also appeared to be ideally cared for.

In order to remove any suggestion of the prison from the plant dormitory, the management provides special rooms for the reception of visiting relatives of the workers, who are also allowed to stay in the dormitories for a few days, free of charge. All bedding, for operatives as well as visitors, is supplied by the company, which also attends to the laundering. Before going to work, the girls must remove their kimono and don the neat black "foreign style" uniform provided by the company. This is done so that all uniforms may be kept clean and fresh. Matrons are in charge of the dormitories and dormitory life.

For male operatives with families the company provides rows of semi-detached houses near the plant which employees may occupy at about one-third of the ordinary rental.

One of the most remarkable features of the Tokyo plant was the dining room, where we were told that 4,000 persons are served with good substantial food at one time. A charge is made for this food but officials told us that it is considerably below the actual cost. Handcars run on tracks down the center of the vast hall.

Looking out over Tokyo Bay is the plant infirmary, a modern, up-to-date hospital in every sense of the word, with competent physicians living on the premises. Nearby are the contagious disease isolation hospital and the bacteriological laboratory.

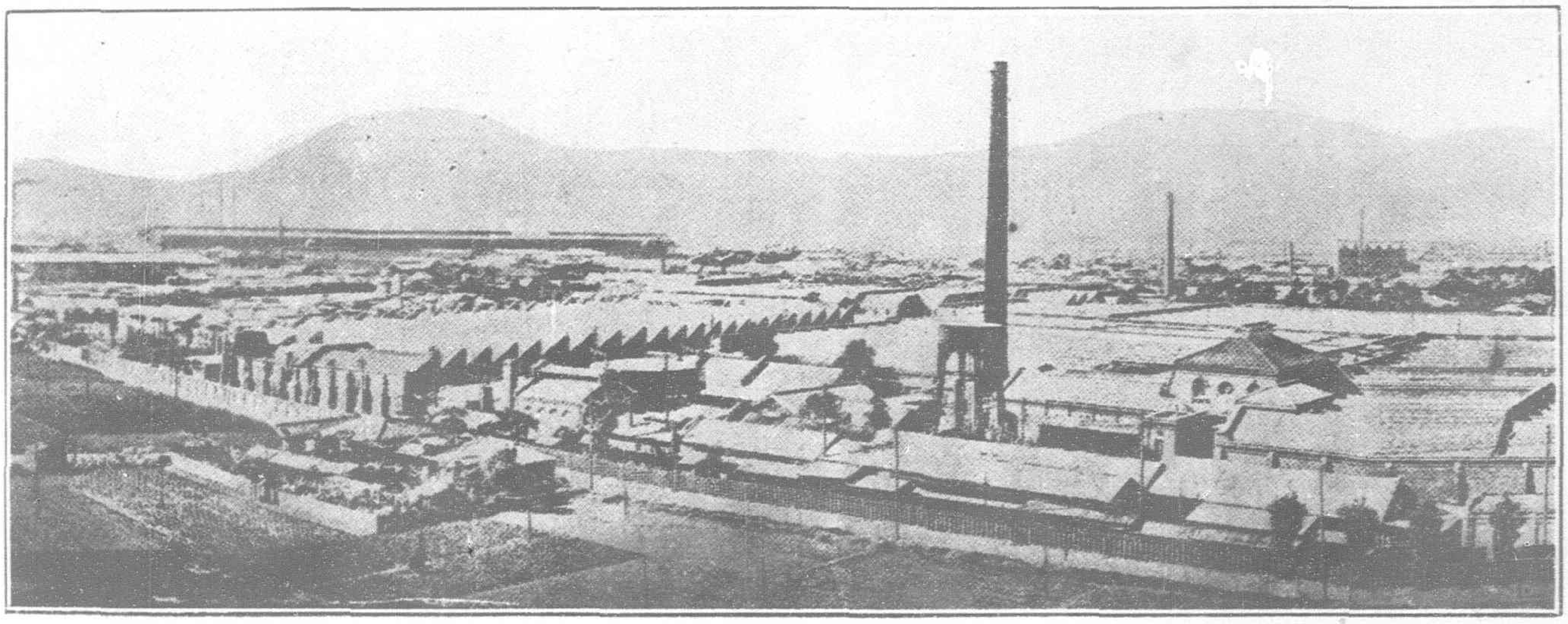
During the summer the company sends employees for whom the doctors have recommended changes of air to approved mountain and seashore resorts, under the charge of nurses, at its own expense. Moreover, it now has three sanitoria on the seashore at various points for those in need of an extended period of recuperation after prolonged illness and sufferers from respiratory troubles.

In the center of the dormitory group of the Tokyo main plant there is a theater with seating accommodations for more than 1,200 workers. Once a week a regular performance is given in the hall and at other times it is open for such entertainments as the employees may devise.

To encourage long service the company has worked out a system of annuities, beginning for the men after 10 years of service and for the women after five. After 15 and 10 years of service, respectively, men and women workers continue to receive annuities for 15 years, even if they have left the firm's employ. After three years of service, all employees are entitled to whatever special bonus the concern's profits for the preceding year may warrant. Special annuities are also provided for workers injured on the job or incapacitated from disease or old age.

To encourage saving by its operatives, Kanebo pays 10 per cent. interest on fixed deposits at its plant employee banks. Withdrawals are discouraged but allowed in cases of emergency, on short notice. The company also will undertake to make remittances to the families of the operatives, free of charge. Demand deposits, in small sums, are also allowed but bear no interest. The company has a special force to keep in constant communication with the families of employees who are far from home. In case of urgent need, it advances funds to bridge over family crises and allows the employees thus favored to make the loan good at their convenience.

On the grounds of each plant there are two fully-equipped schools. The first is for operatives, generally girls from the rural districts, who have had scant opportunities for education. The other is for the more ambitious among the male workers who wish to attain technical training. The classes meet in the afternoon and evening, before and after the shifts change.



Cotton Mills at Hyogo

Discipline must naturally be strict, but in order to protect the interests of an employee accused of breaking rules, the committee of punishment is chosen from among the workers. Its recommendation carries considerable weight with the officials and the institution has earned the respect of the operatives.

It might as well be noted here that the idea of boxes for suggestions and complaints was taken by Mr. Muto from the American *Review of Reviews*, which gave an account some years ago of methods used by Mr. Patterson, president of the National Cash Register Company.

Working with contract labor as it does and in a country which does not hire and fire lightly, the Kanegafuchi Spinning Company generally has to keep more hands than it needs. When there is an excess of labor in any one mill, the operatives are allowed holidays by turns and receive 70 per cent. pay for the time they are absent from the job.

Another factor making for contented workers is the company's established principle, which has stood the shocks and business depressions of over 40 years, that it will dismiss no one who is able and willing to work and is loyal to the interests of the company.

In case some of my readers may think that the Kanegafuchi mills pay excessively low wages, I might mention that girls such as those in the Tokyo plant often become domestic servants for one yen a year, clothes and food. I know grown men who work for less than $35 a month, some of them graduates of American universities. A Japanese, living on rice and fish, rice and vegetables, rice and still more rice, can feed himself for less than 15 cents a day. But with a problem of tremendous over-population and economic depression the whereabouts of that 15 cents is often perplexing.

Japan is now the foremost manufacturing nation of Asia. Especially is this true in the making of cotton yarn and cloth. The Empire is now consuming about 2,000,000 bales of raw cotton a year. India accounts for about 50 per cent of this, the United States for 30 per cent and China, Egypt, Korea and Australia make up the remainder. Not content with dependence upon far-distant sources, the nation is planning to develop plantations in the Kwantung leased territory. Only 2,200 acres there are now bearing cotton, but the Government-General has granted a subsidy to the Raw Cotton Plantation Encouragement Society in Dairen, which is planning to increase the acreage to 196,000 by 1933. Spinning companies here are backing other similar enterprises in Kwantung.

Kanegafuchi and Fuji Spinning interests are in back of the proposed incorporation of the Peru Raw Cotton Company, with a capitalization of $1,500,000 yen. The former have appropriated 80,000 yen for an extensive survey of the 6,200,000 acres of land which the Peruvian Government has offered rent-free to the Japanese capitalists.

Last year Japan produced 2,249,000 400-pound bales of cotton yarn and exported 293,781. China took more than half and India ranked second. Japan in 1925 produced 1,179,524,733 yards of cotton cloth and exported $60,000,000. China took 239,000,000 yards, Manchuria 161,000,000, India 162,000,000, the Dutch East Indies 86,000,000 and Africa, Straits Settlements, Arabian Persia, the Philippines and the Balkans absorbed the balance.

In three years Japan's revised factory law, prohibiting late night work for women and children, goes into effect. In order to prevent this measure from cutting down production, the leading spinners are taking steps to gradually increase the number of spindles in operation.

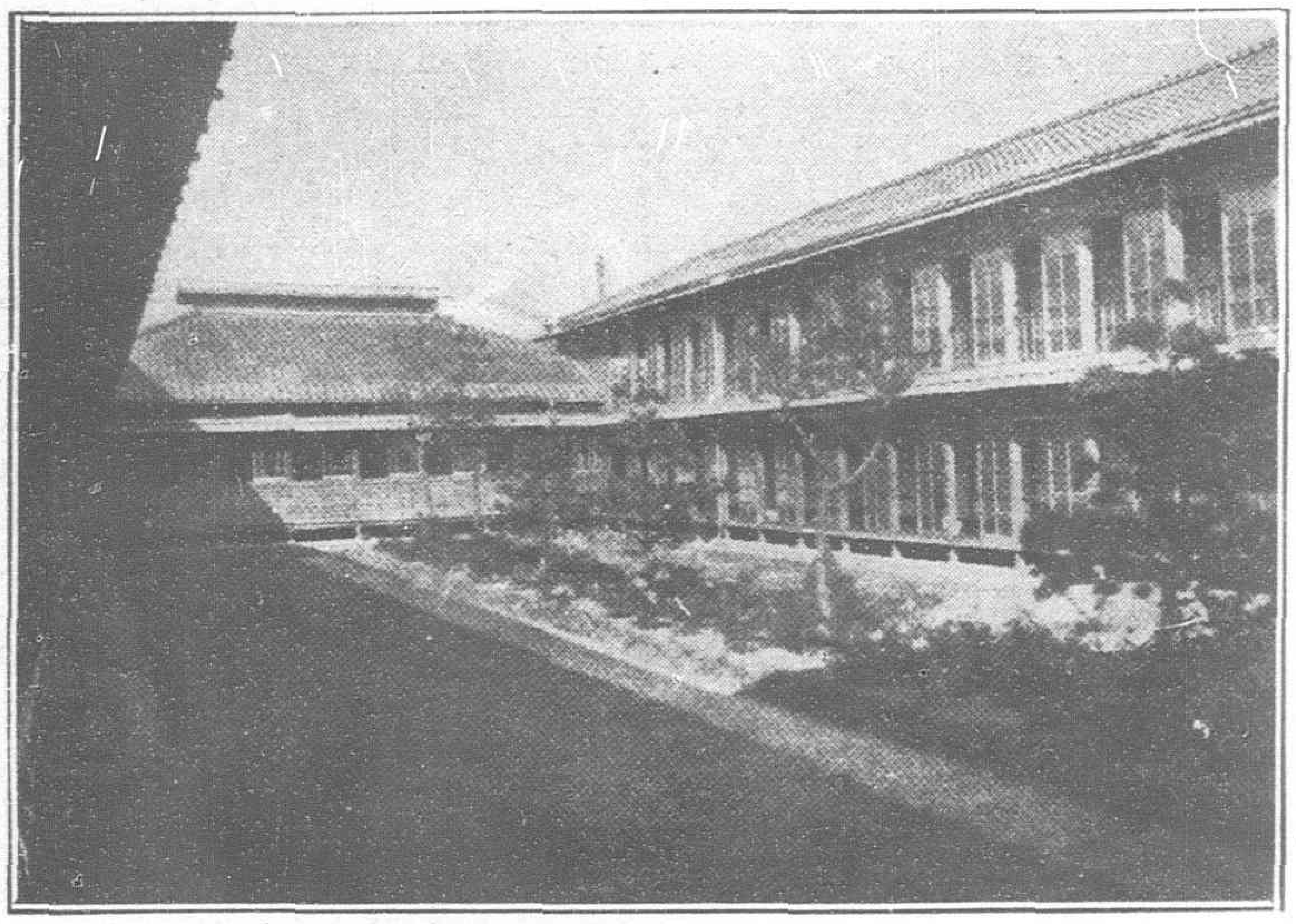
The Constitution

Supplementing Mr. Burton Crane's interesting article, we give the following preface from Its Constitution, which explains the idealistic motives permeating its attitude toward labor:

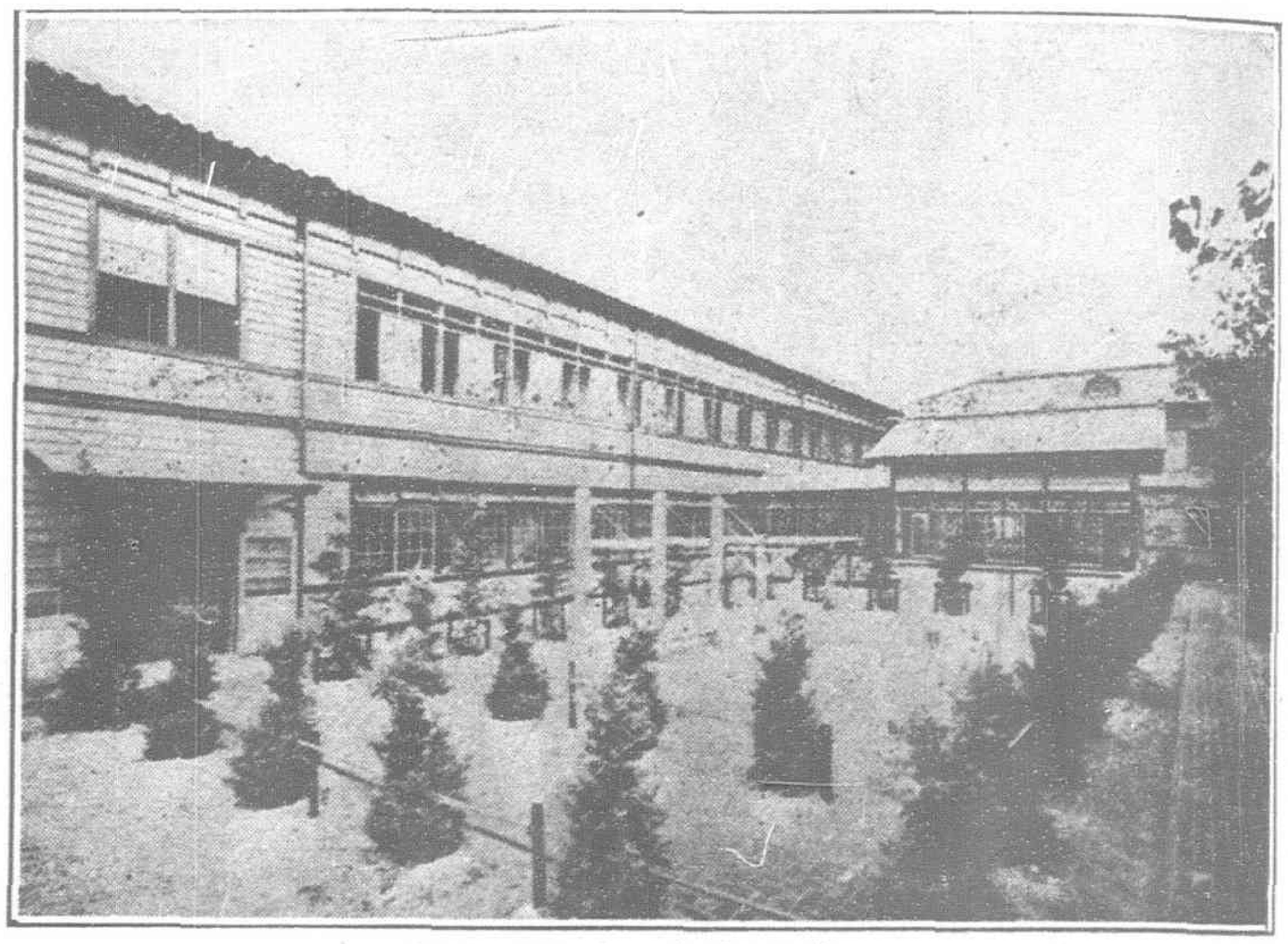
The Management of the Kanegafuchi Spinning Company takes pleasure in outlining in the following pages, the various measures which for some years past, it has been taking for the relief and general welfare of its employees and operatives.

It will be noticed that the provisions regarding medical treatment and other relief measures in cases of illness, injury, death, financial distress, etc., are made quite elastic, and a wide latitude of action is granted in their application, thus providing for every need. Not only the operatives derive benefit from these provisions of the Company, for which special funds are maintained, but they are also entitled to additional and supplementary reliefs, such as extended medical treatment, monetary grants, etc., through being *ipso facto* members of the Kanebo Mutual Benefit Association, to which they pay a nominal membership fee. Furthermore, the "Asabuki" and the "Nakamigawa" memorial funds which were founded to perpetuate the memory of two distinguished Directors of the Company, who were noted for their benevolence and meritorious services, can be drawn upon to further relieve distress, if the Administrators of the Funds consider such help advisable. Thus three sources of benefit exist.

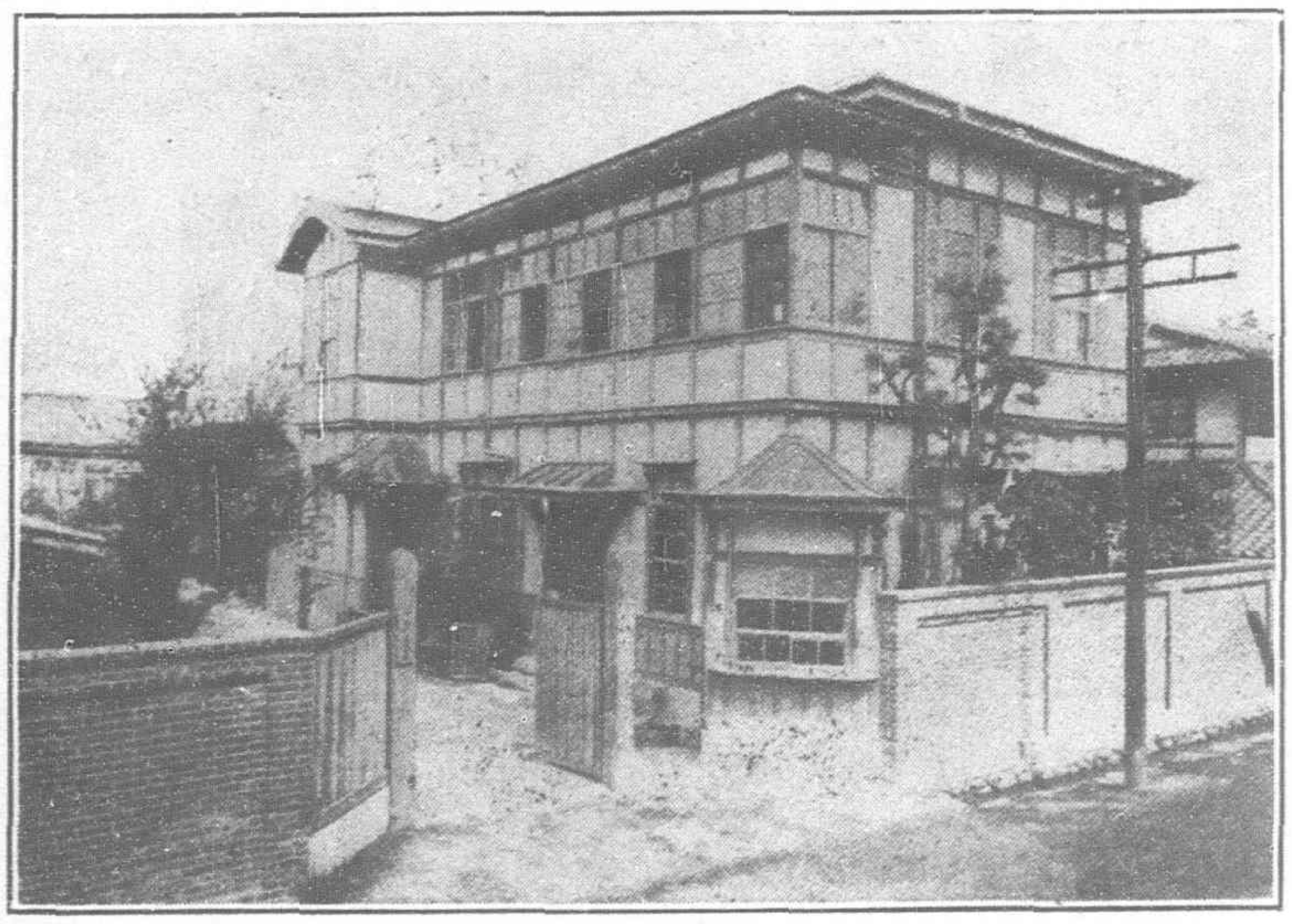
There is in Japan a Factory Law, that makes relief obligatory in certain cases, but we hold that neither its plan of operation nor its scale of relief is quite to our satisfaction. We desire and endeavour to protect workers from any and every distress. This is not said in a spirit of boastfulness, but with a sincere hope that our example may be followed generally and that the Government may be induced to incorporate into the Factory Law a thoroughgoing and adequate system of relief. ■



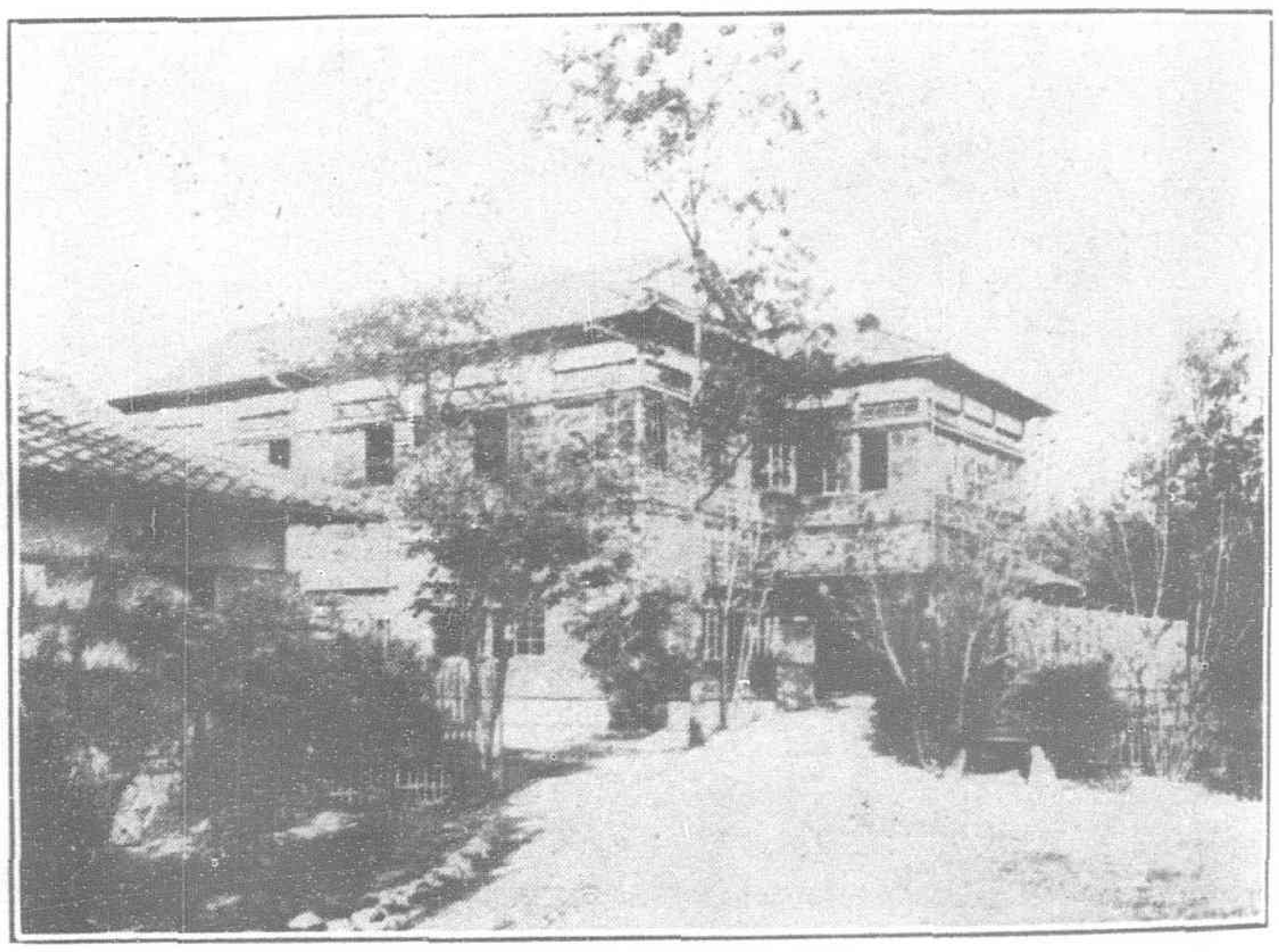
Female Workers' Dormitory



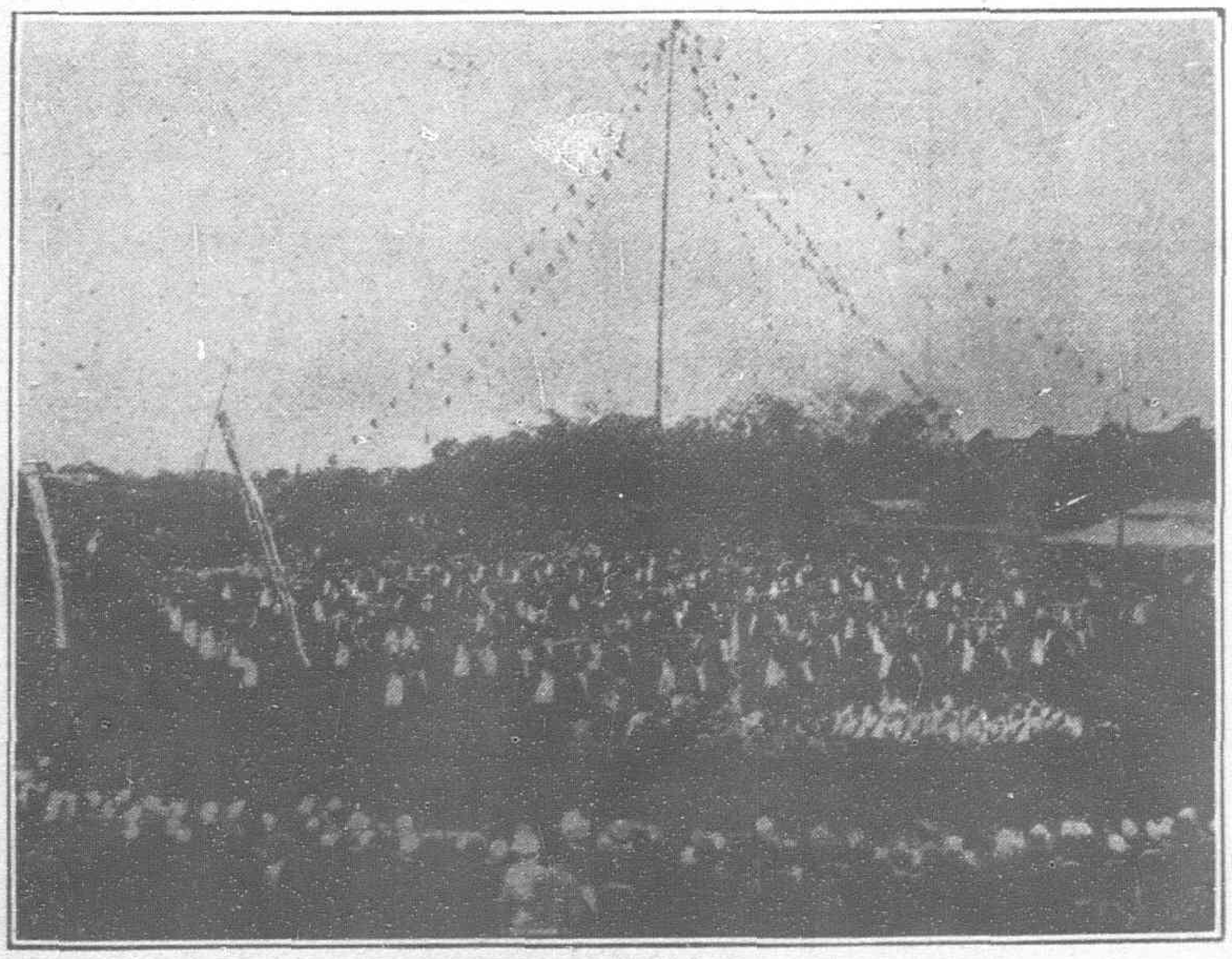
Male Workers' Dormitory



Overseers' School



Club House



Workers at Play

Female Workers at Study

Under the Company's provisions for Pensions and Allowances (Part IV), rewards for long service have been inaugurated, which have become a special feature in the benefit system of the Kanegafuchi Spinning Company. This is an entirely new departure in the industrial life of Japan.

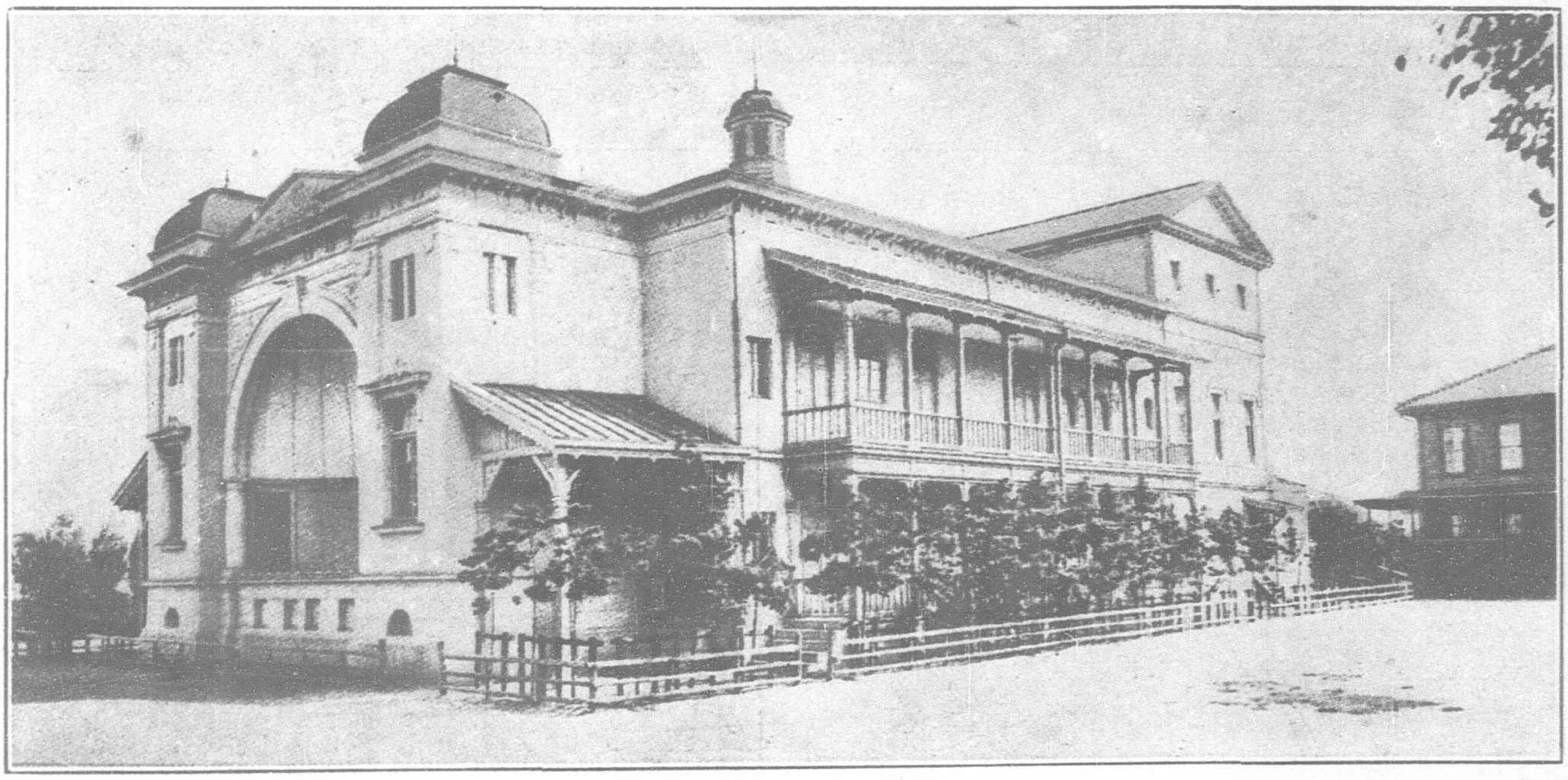
Again, the abnormal increase in the cost of living is producing much difficulty everywhere, but the hardship of the wage earner is most acute. As a means of relief, this Company does not merely increase the wages of its workers (a measure not always sure to bring a desirable result as the recipient is often tempted to spend more on luxuries than on necessities), but has adopted the plan of providing houses and of allowing subsidies towards house rent; and of selling meals, provisions, fuel, clothing, etc., at a nominal price. Thus the standard of living of the workmen and their families has been raised much higher than it would have been by a mere increase of wages. This fact is especially demonstrated in the question of housing. The Company naturally suffers a large pecuniary loss in carrying out this plan. To quote the latest figures, the amount was Y.312,600 ($156,300) in the month of August, 1919. But the Company feels amply compensated for the loss in the realization of the comfort and happiness enjoyed by its workmen. Thus freed from financial anxiety and with the sense of security somewhere in their consciousness, the workmen have been enabled to maintain a very high standard of efficiency.

2. Medical Treatment and Admission to the Hospital, for Non-resident Operatives.—When non-resident operatives fall ill, they are visited by the Company's doctors at their own homes, but when the doctors consider the case to be too serious for home treatment, or the nature of the illness requires attendance in the Hospital, the patients are admitted thereto, if there are vacancies in the wards. The fees and expenses at the Hospital are charged at the actual cost, medicines and drugs being supplied at the regulation low rates. When, however, the patients are unable to pay the said charges, the Company pays them so that the result is in effect a free treatment.

3. Charges for Operations and Medicine.—Out-patients are treated and supplied with medicine at reduced charges, which are not sufficient to cover the cost, the losses thus incurred being borne by the Company. Medicine in the form of liquid or powder, is charged for at the rate of six sen (about 3 cents gold) per day, per patient, while other forms are charged for at equally low rates.

At the request of the patient, or when the nature of the disease requires it, more expensive medicines are given, or costly injections are administered, which are charged for at a rate much less than the actual cost, the difference being defrayed by the Company.

4. Treatment of Sickness and Injury incurred during the Performance of Duty.—In the event of any of the operatives being injured, or falling ill, during and owing to the discharge of their assigned work, the Company at once sends them a solatium, and gives medical treatment, at the expense of the Company. Moreover, the Company pays full wages to the patients, or the injured, until they are fully recovered and able to resume their work. In case the nature of the illness or the injury is such as to leave a permanent disability, the Company grants a special allowance or otherwise provides for them for the rest of their lives. Should they die, as a direct result of injuries sustained, or illness contracted, while discharging their duties, the Company grants an allowance to the surviving members of their families, in the form either of a lump sum or of a monthly relief, until such time as the surviving members become self-supporting.



Workers' Recreation Hall

It might be intimated that the Company could afford to be extravagant on reliefs because its business has been exceptionally prosperous. But other commercial firms are no less prosperous. And the Kanegafuchi Company has had its evil days, and it was in these evil days that the relief measures were actually inaugurated, and they have been but expanded since.

The Company prides itself on its prosperity but it admits that, in addition to the economic factors which favoured other companies as well, its present prosperity is largely due to the hearty co-operation of the Management and the Employees, and to the cordial response of the latter to every endeavour to render the conditions of their employment more humane and enjoyable.

As a matter of record and to show concretely how the Kanegafuchi Social service operates, the rules governing the treatment and Relief of the sick and the injured are here given in full:

1. Medical Treatment and Hospital, Free for Resident Operatives.—A Hospital is established in each of the Mills of the Company, to which sick resident operatives, of both sexes, are admitted. The cost of medical attendance, medicine, food, and other necessaries being defrayed by the Company.

The Hospital consists of five departments: Medicine, Surgery, Ophthalmology, Obstetrics and Dental Surgery.

A director presides over all of these Departments, each of which is in charge of a Specialist, whose services, as well as those of Midwives, Nurses, and their assistants, are available at all times.

The details of procedure are stipulated in the "Regulations for Relief to Operatives," and the "Regulations for Pensions to Retired Employees on account of Sickness, Injury, Old Age, etc.," which follow:

Regulations for Relief to Operatives

(N.B.—It is to be understood, that in all the following articles, both male and female employees participate equally, except wherein otherwise specified).

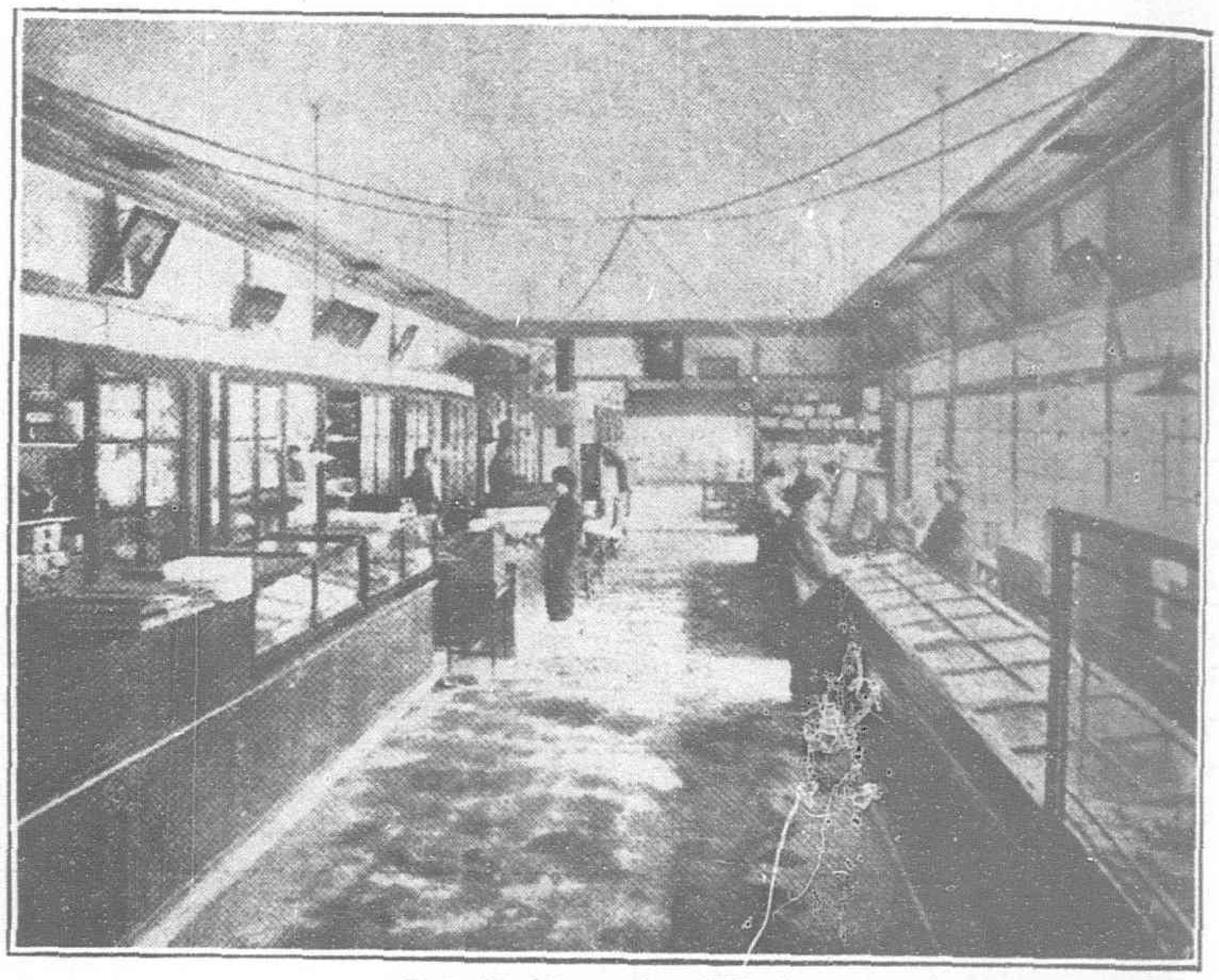
Section I. General Rules.

Art. 1.—The Company shall have a Relief Committee at its Head and Branch Mills. The Committee shall investigate various matters connected with aid to, and relief of, the operatives in the employ of the Company.

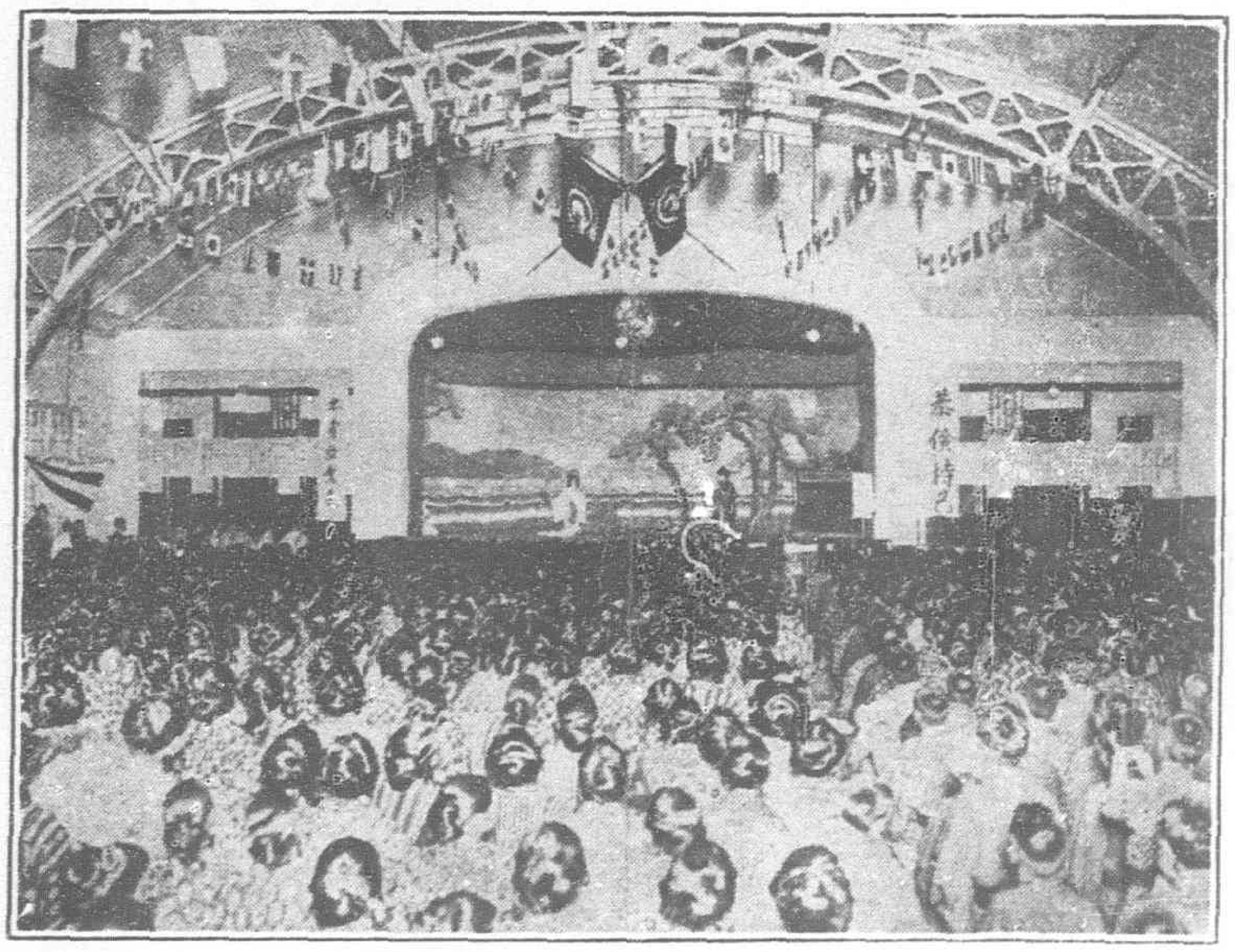
Art. 2.—The work of aiding and relieving the needy operatives, shall be in charge of the President of the Company, who shall decide on a given case, taking into account the report of the Chairman of the Relief Committee, and the opinion of the Mill Manager. In serious cases requiring an immediate attention or in those minor

(Continued on page 578).

Classes for Dressmaking

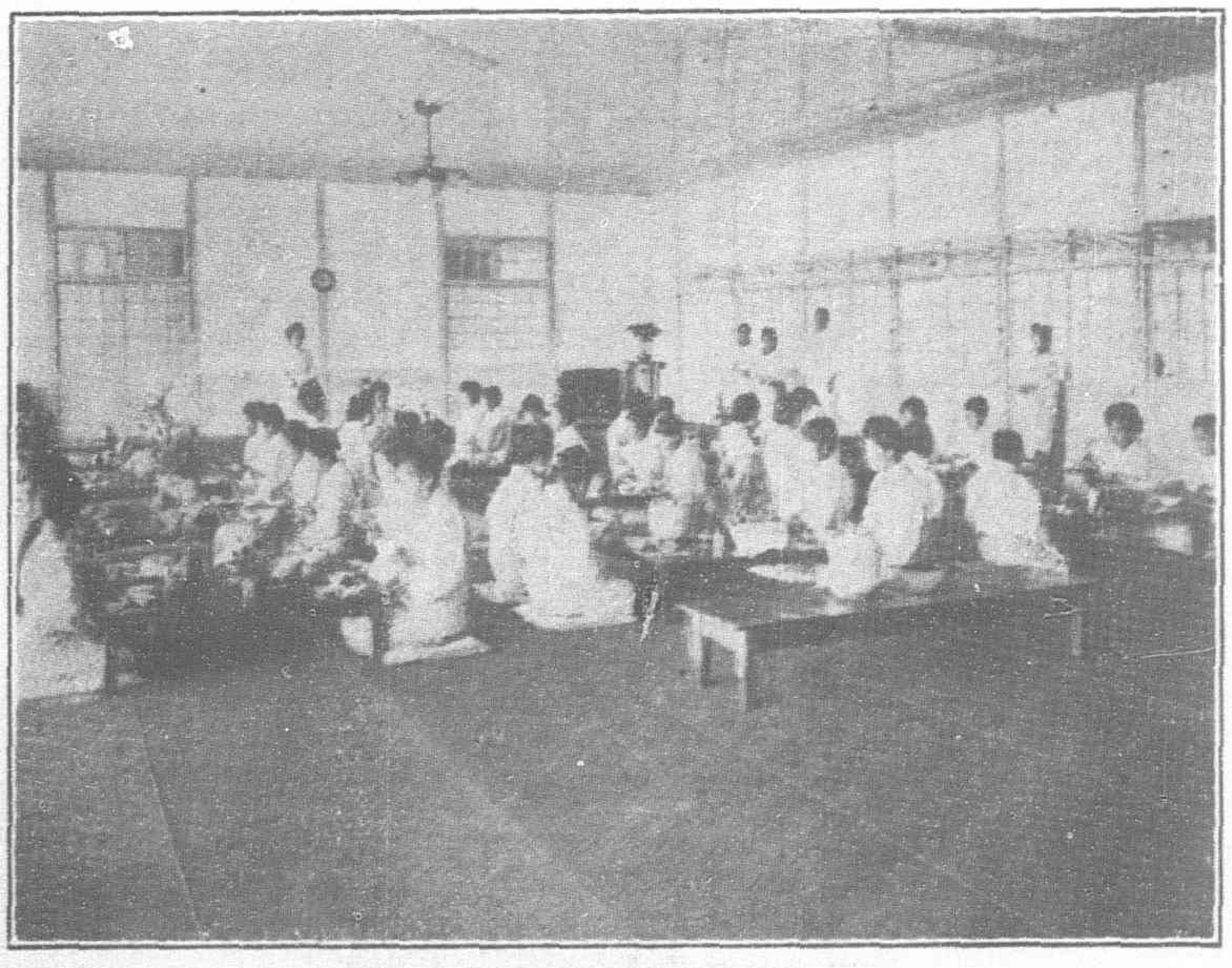


Retail Shop for Workers

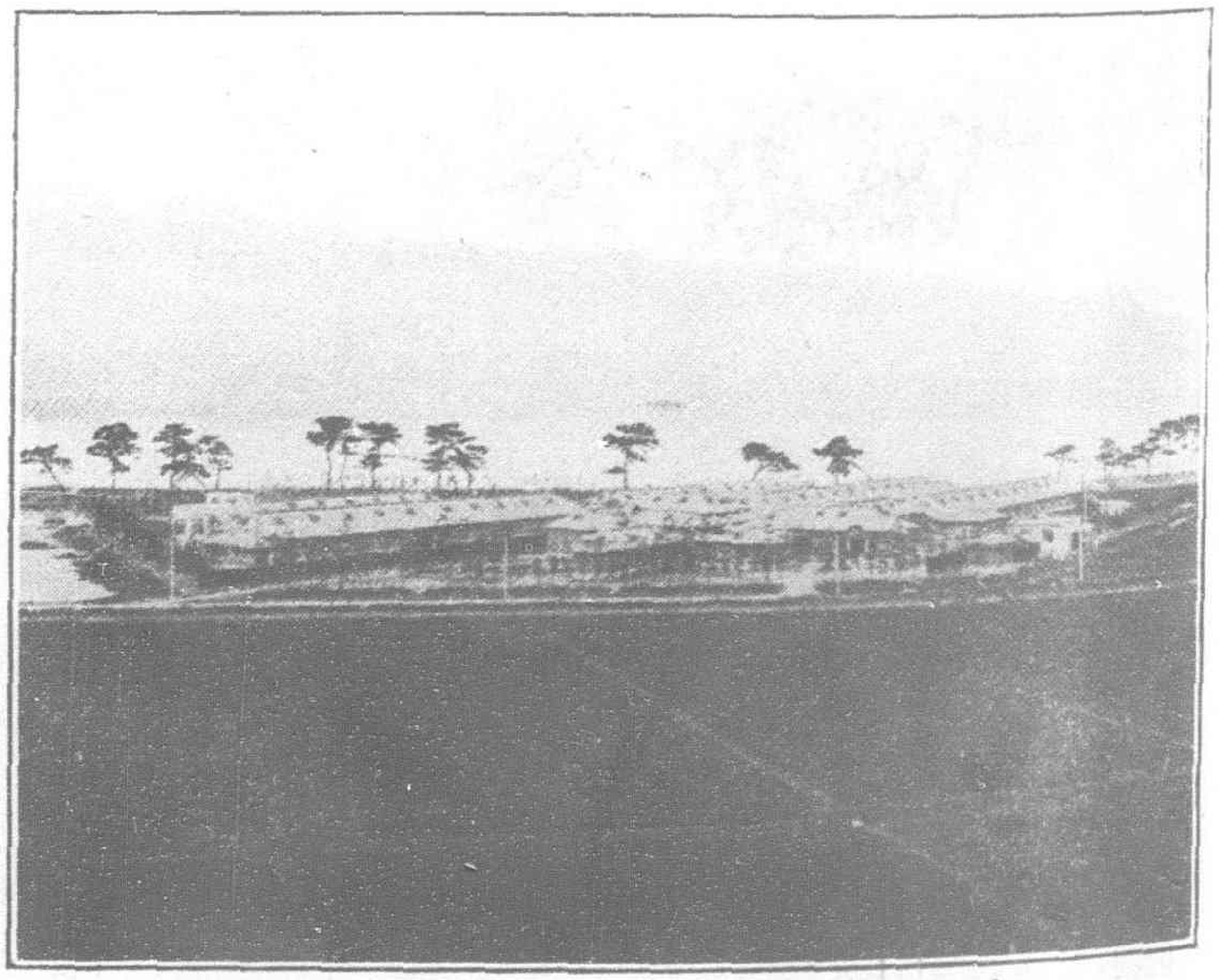


Enjoying Theatrical Plays

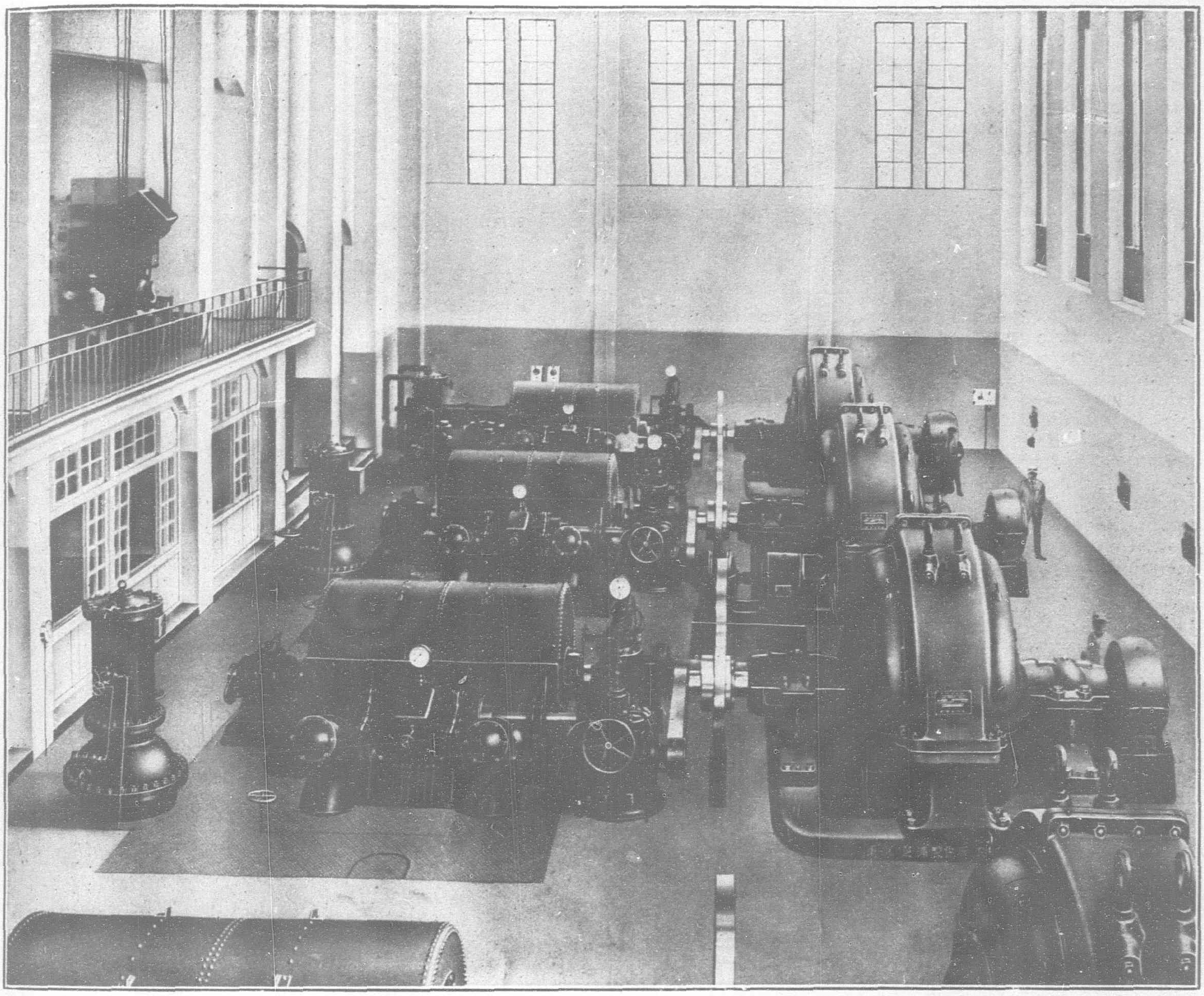
Interior of the Hospital



Convalescents' Dining Room



Bird's Eye View of the Takasago Sanatorium



The Kuretsubo Power Plant of the Tokyo Electric Power Co.

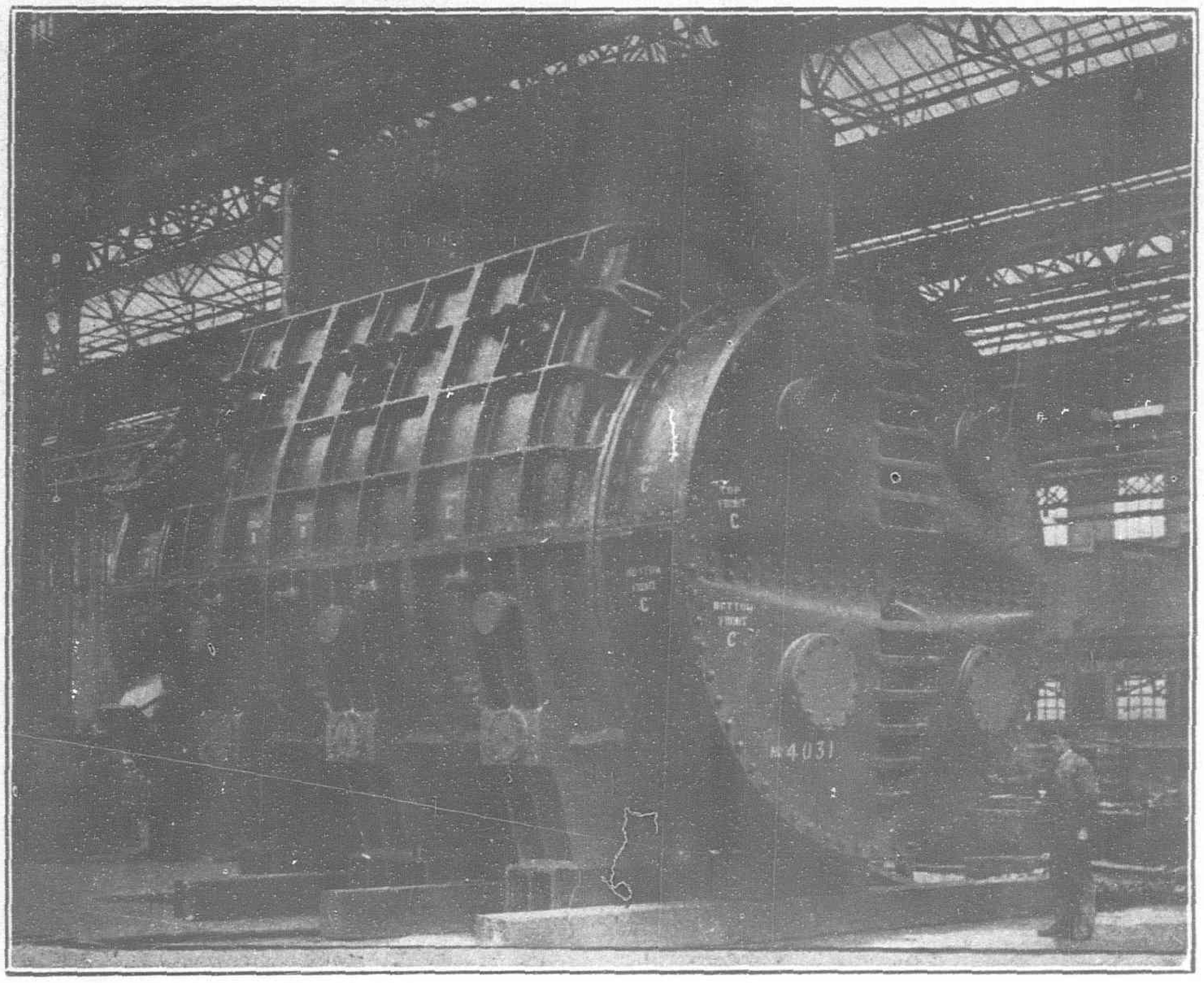
Japan's Remarkable Electrical Development

By Burnett Walker, Vice-President of Guaranty Company of New York

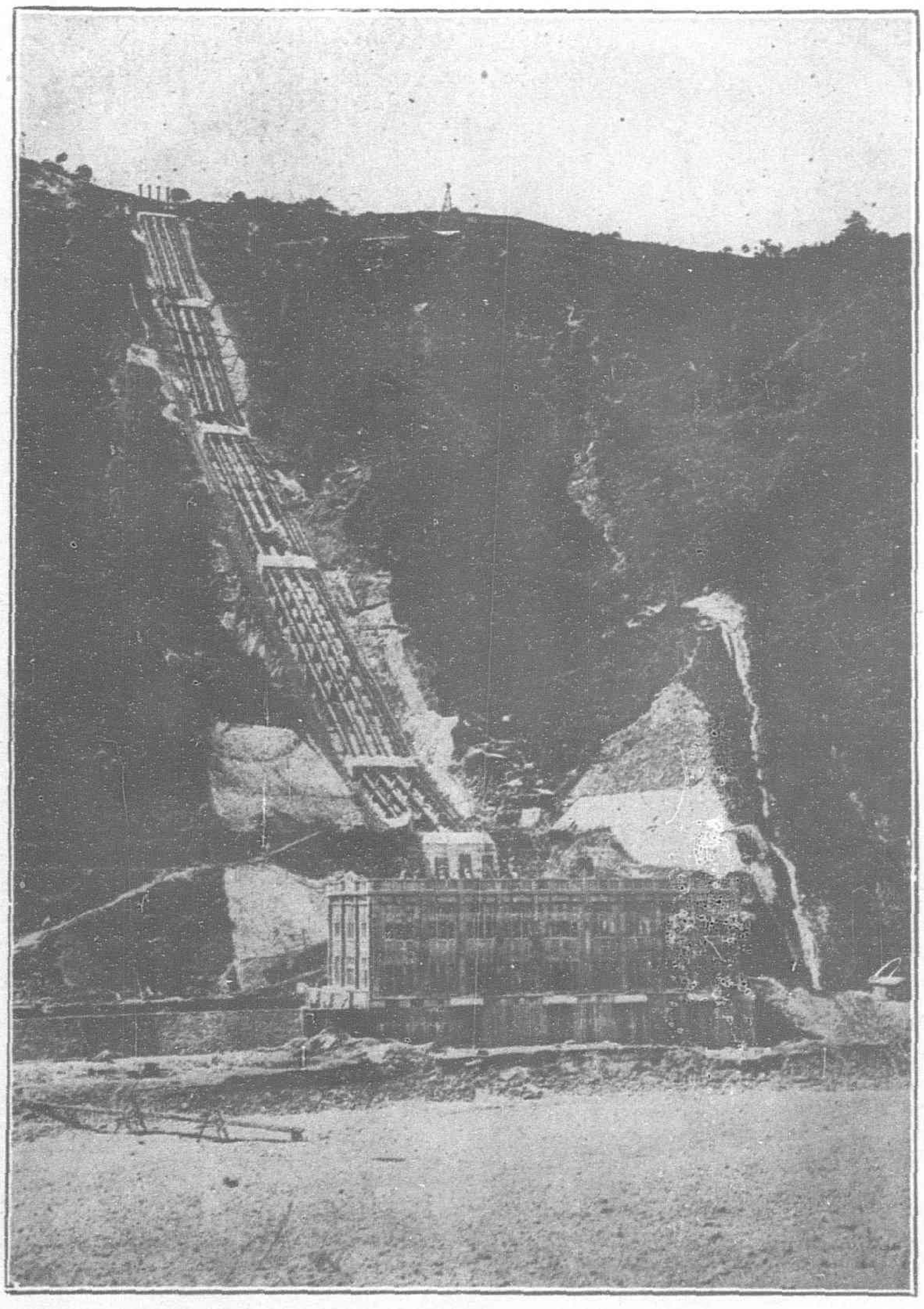
THE development of electricity in Japan is one of the outstanding and remarkable features of that remarkable country. Most people in America will be surprised at the statement that there is to-day probably a greater proportion of houses lighted electrically in Japan than in any other country in the world—not even excepting the United States. Practically all of her large factories use electrically driven machinery. By the end of 1923, investment in Japan's electric industry had mounted to well over a billion dollars and in total generating capacity she was outranked only by the United States and Germany. The unique appeal and picturesqueness of Japan—the sort of things the Westerner pictures as typical of that country—are still there, but the development of her electrical industry is indicative of Japan's attainments in our present day industrial world.

How Japan Developed Electric Power

The industry had its start in Japan almost as long ago as in any other country. Small units were established in many cities in the late 80s and early 90s, the first one in Tokyo in 1887. These early companies generated their power almost entirely in small steam stations. Water-power was not then being used as it is to-day. To carry power over transmission lines for more than a very few miles was out of the question because of the loss of power in transmission. But the development of long-distance transmission, which in itself is one of the outstanding accomplishments of recent years, has now progressed to such a point that in Japan energy is transported economically for a distance of approximately 200 miles at a tension of 154,000 volts, and there is active discussion now of high-tension transmission lines of even greater voltage. The counterpart of this, the much discussed "super-power" system is already in existence in Japan and its extension is a part of the future program in the industry. This development gives most of the large companies the advantages of connecting with the lines of other companies and of interchange of power on a mutually advantageous basis.


The Kawasaki Plant of the Tokyo Electric Power Co.

As a country situated geographically much like England, Japan's great progress, almost certainly, is to be along industrial lines. Her people are splendid industrial, as well as agricultural, workers, and in view of this industrial progress it is a natural and in fact, essential development that her electrical industry should be pushed forward not unlike the way in which it has been advanced in the United States and in certain parts of Europe. The electrical industry in Japan fortunately recognizes its importance and is continuing to increase its facilities to take advantage of this constantly growing demand.


The Kuretsubo Power Plant (20,000 k.w.) of the Tokyo Electric Power Company

Control of Industry in Strong Hands

In the United States the principle of consolidation of small electric and certain other utility companies into fewer and larger companies has been demonstrated to be economically sound. Its usual result is better service at lower cost to the consumer and at the same time greater assurance of a fair return to the owners and operators of the properties. This same development has taken place in Japan, where the electric industry now, to a great extent, is under the control of a few large, well-managed companies. Their inter-connected systems serve many millions of people and a wide range of industries in districts covering large areas. This diversification of load in Japan, as in the United States, has given the electrical industry certain of its most essential elements of stability and strength.

American Influence in Industry

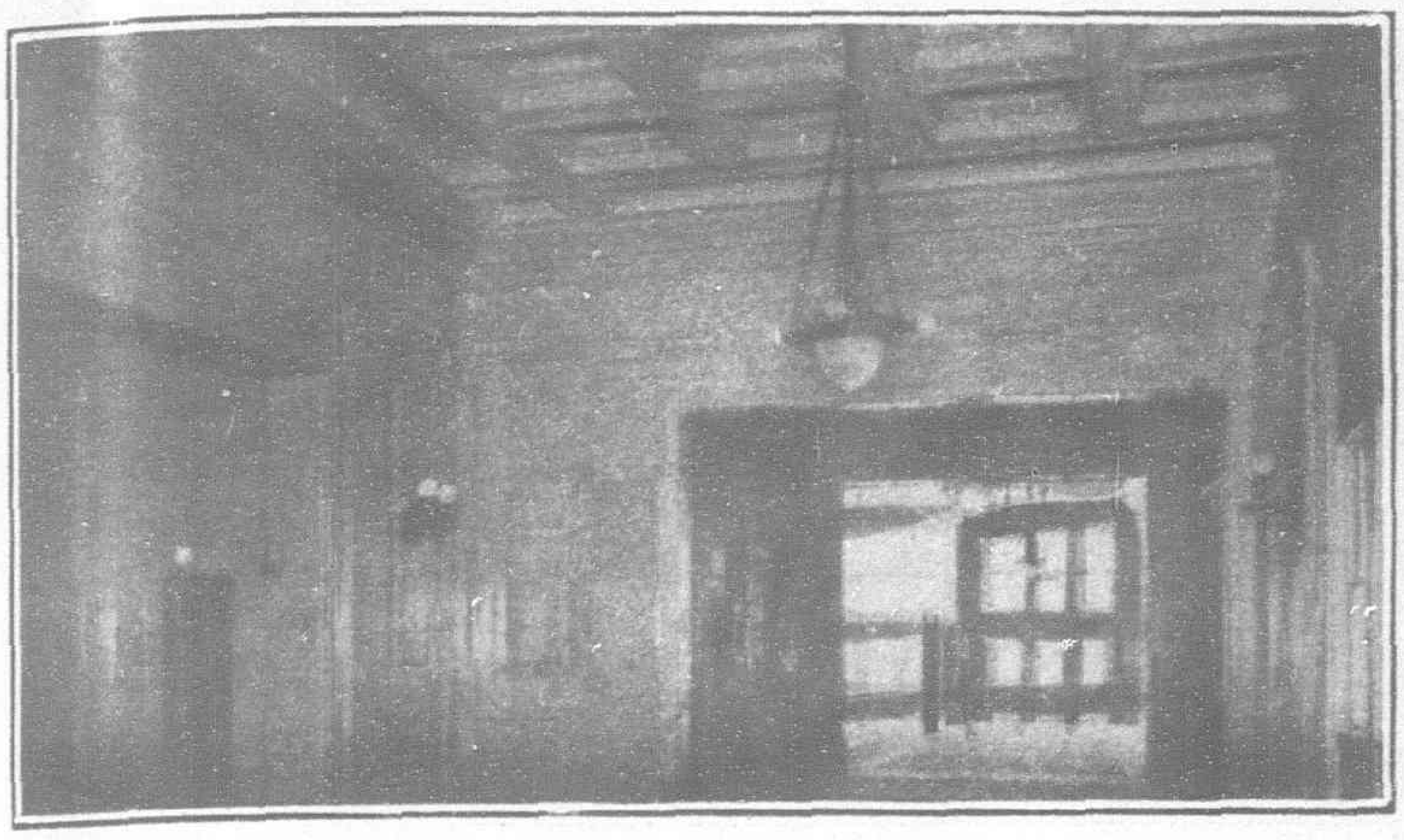
The influence of America in the industry is immediately apparent to anyone visiting Japan's electrical properties. While one sees British, German and Japanese equipment, the names of the largest American companies manufacturing electrical equipment, turbines, boilers and the like are to be seen almost everywhere. Operations are carried on almost exclusively by Japanese engineers, but one usually finds that the head men, and many if not most of the younger engineers, have had some of their training in American universities and perhaps also in the best of our own electric companies. In going into the electric stations in Japan, the equipment and general plant construction are so much like those in the United States that the American visitor has to think twice to realize that he is not at home.

Importance of United States to Japan

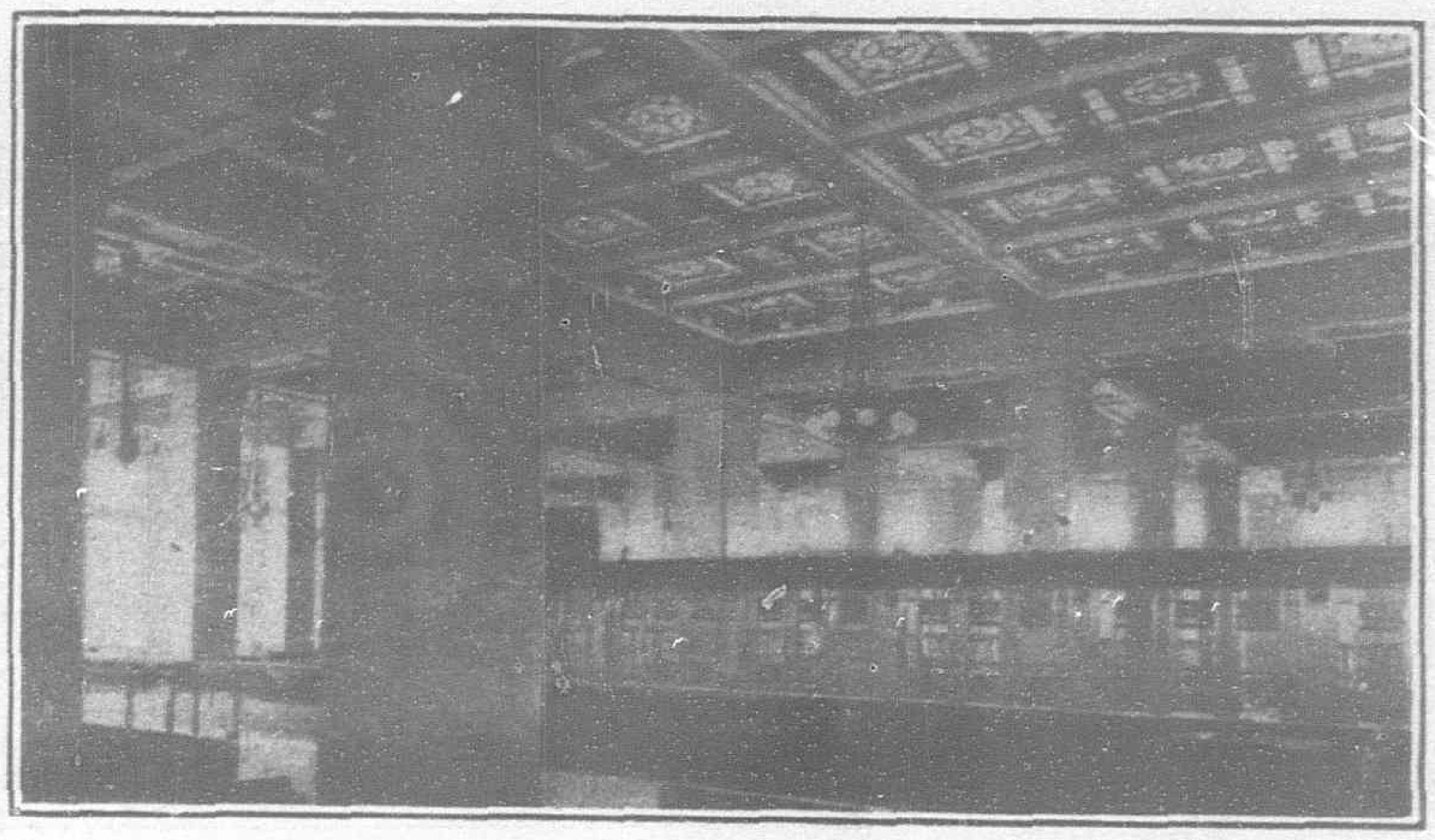
It is quite natural that we in America should think of any other part of the world in terms of their importance to us rather than in terms of our importance to them. But it may not be uninteresting to turn it around; to consider the importance of the United States to Japan. Take the figures of her foreign trade, a matter of basic importance to Japan and on which she is working characteristic diligence. They are illuminating and significant. In 1924, the United States sold Japan less than 6 per cent. of our total exports. But Japan in the same year bought over 27 per cent. of her foreign purchases in the United States. We bought from Japan in the same year approximately 9.5 per cent. of our total imports (not a small proportion to buy from a single country), but Japan sold us over 41 per cent. of her total overseas shipments. Her trade with the Asiatic continent is large, but the United States bought over 41 per cent. of her total, as against less than 59 per cent. for the rest of the world.

In the matter of capital, within about a year and a half the Japanese Government has floated an issue of $150,000,000 of its Government bonds. Within approximately the past year, in

(Continued on page 575).



Main Entrance Hall



Main Banking Floor of the Sumitomo Bank, Ltd.

The Sumitomo Building at Osaka

Preventitive Construction Against Earthquakes and Fires

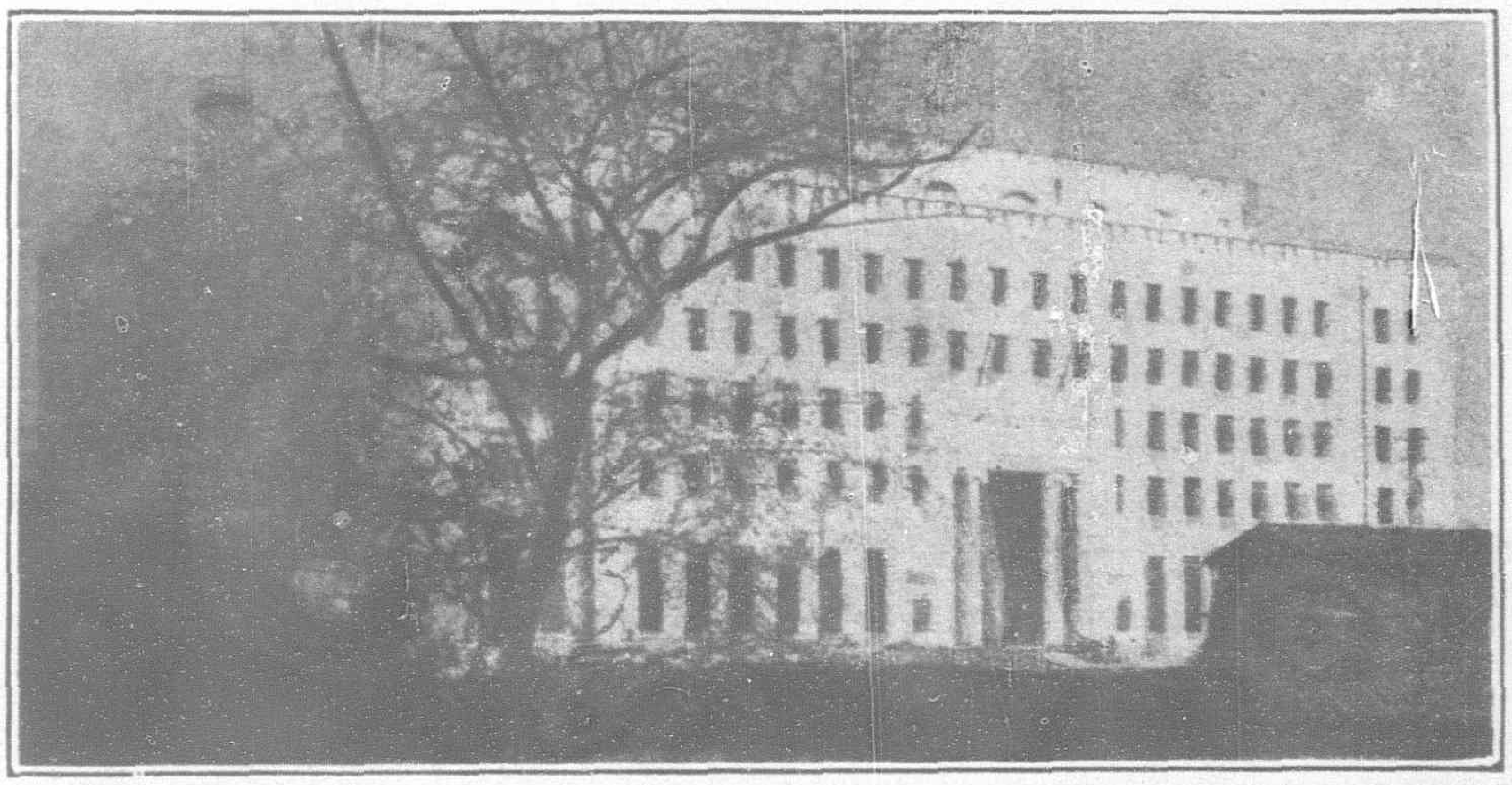
THE progress of the city of Osaka, Japan's industrial and commercial center, is characterized by the construction of large buildings in rapid succession ; quite a number of them have just been completed, and still many of them are under construction or being planned.

The main feature of the recent building industry in Japan is the remarkable increase in the per square yard cost of construction, which is a result of the earthquake disaster in the Tokyo-Yokohama district of 1923. All the builders not only of buildings but bridges, highways, harbors, etc., now take into account to possible calamities in the future resulting from earthquakes and consequent fires, hence the increase in the per square yard cost of construction. The Gosho building, the Asahi Hall, and the Sumitomo building are among the main buildings just completed.

Sumitomo Building

The Sumitomo building, the construction of which was commenced in December, 1922, at 5 chome, Kitahama, Higashi-ku, Osaka, and was completed in April, this year, after three years and five months, is of Modern Renaissance style. It is a six storied building, including the basement, and the site extends to a little more than two acres. The building area amounts to 3,629 square yards, the extended floor area amounting to about 11,500 square yards. It is intended that on the southern side of this building will be constructed another building of the same size. This building has an attached house, of which the building area is 392 square yards, and the extended floor area of the basement and the ground floor amounting to 772 square yards.

The Sumitomo building has a frontage of 244 feet, (from west to east, between posts) and a depth of 150 feet, (from north to south, between posts) and the height is 80 feet from the ground to the edge of the fifth floor, and 100 feet from the ground to the top of the pent house.



General View of the Sumitomo Building. Construction was Commenced in December, 1922, and Finished in April, 1926. Another Building of Similar Size will be Constructed on the South Side of this Building.

At the center of the northern frontage of the ground floor is the main entrance, and there are side entrances at the western and eastern sides.

In the basement, which extends to 3,683 square yards are the vault, the safe for important papers, library, godown, printing office, electric transformer room, storage-battery-room, air purifier room, cement testing room, and rooms for caretakers, porters, and office boys.

The ground floor, which extends to 3,620 square yards, is occupied by the offices of the head office of the Sumitomo Bank, Ltd.

The second floor, extending to about 3,210 square yards, is also for the head office of the Sumitomo Bank, Ltd., and the third floor, 3,210 square yards, is occupied by the Sumitomo Partnership, which controls all the enterprises of the Sumitomo interests.

The fourth floor, 3,210 square yards, is comprised of the Sumitomo Partnership, the Sumitomo Life Insurance Company, Ltd., and the Sumitomo Building Company, Ltd.

In the fifth floor, 3,210 square yards, are the offices of the Sumitomo Copper Sales Department Partnership, the Sumitomo Afforestation Partnership, the Suitomo Fertilizer Manufacturing Company, Ltd., and a dining room.

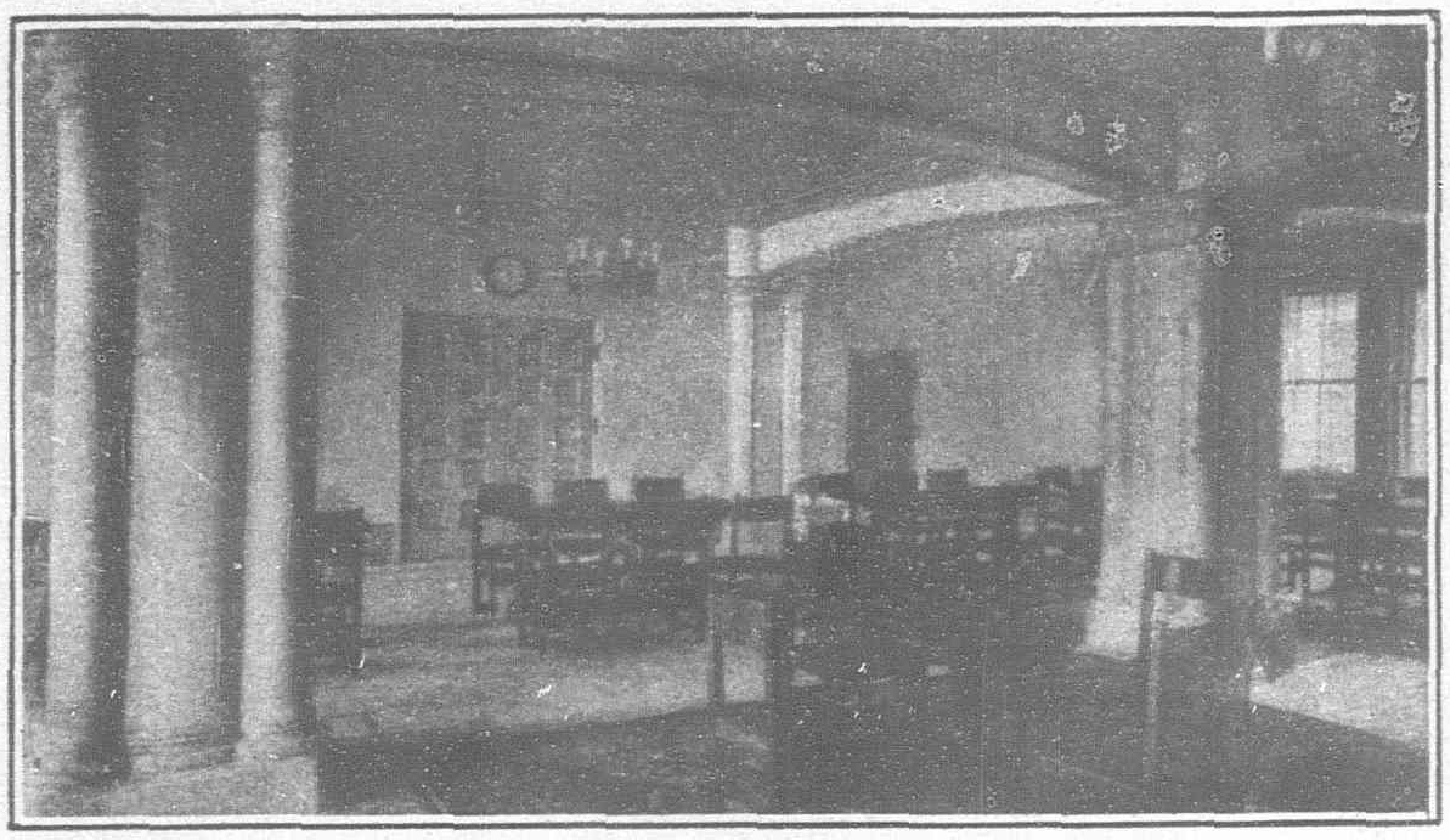
The sixth floor, 1,292 square yards, is reserved for recreation rooms, elevator machinery room, water tank, ventilation equipment room, engineering photographic (blue prints) room.

On the roof are the sight-seeing room, the elevator tower, and the fire-fighting reservoir.

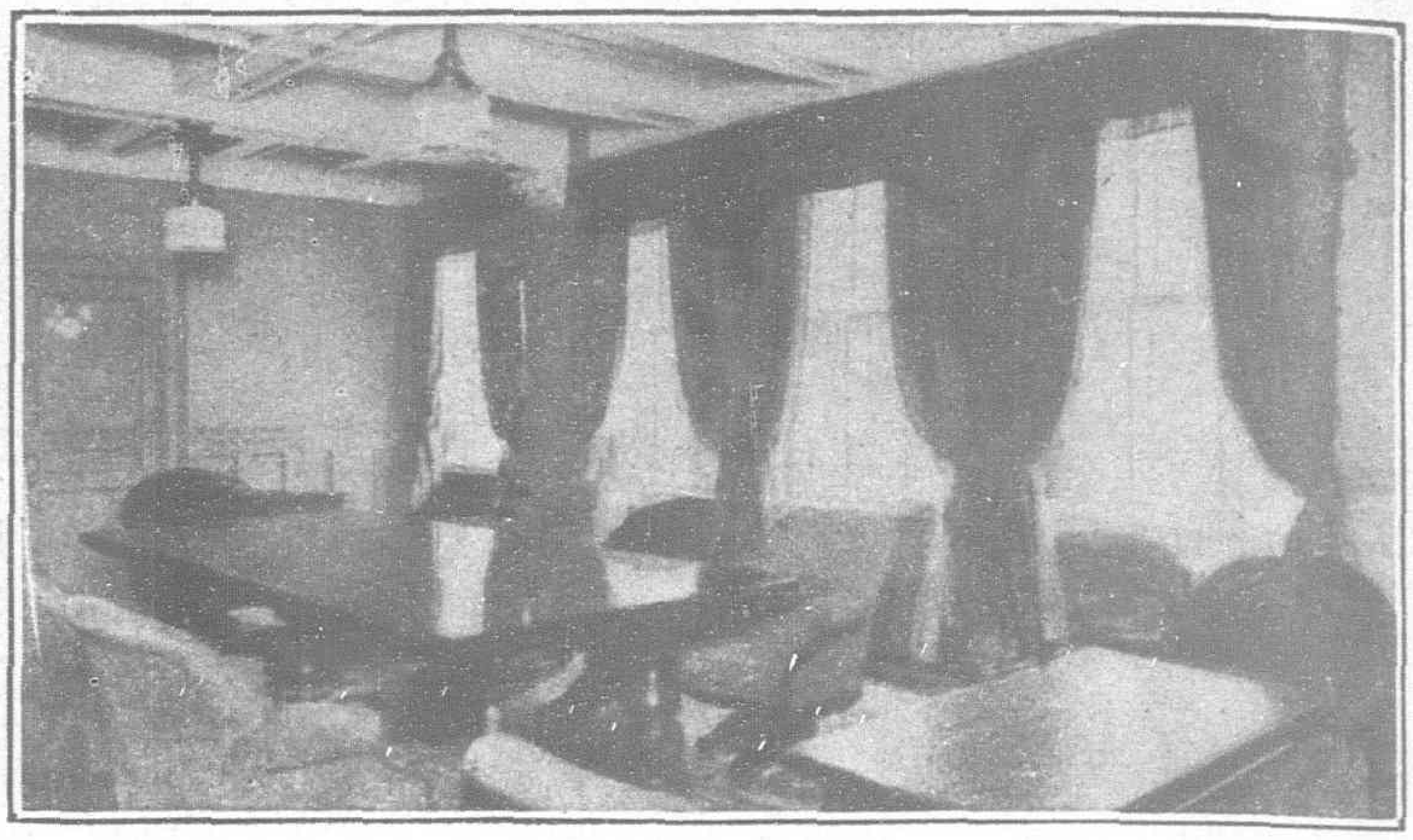
As for the attached house, the basement is used for the engine room for the steam heater, pump room and coal storage, and the ground floor is for the garage.

Fire-Earthquake-Proof

The new Sumitomo building is fireproof and earthquake-proof. It is a reinforced-concrete building, using something like

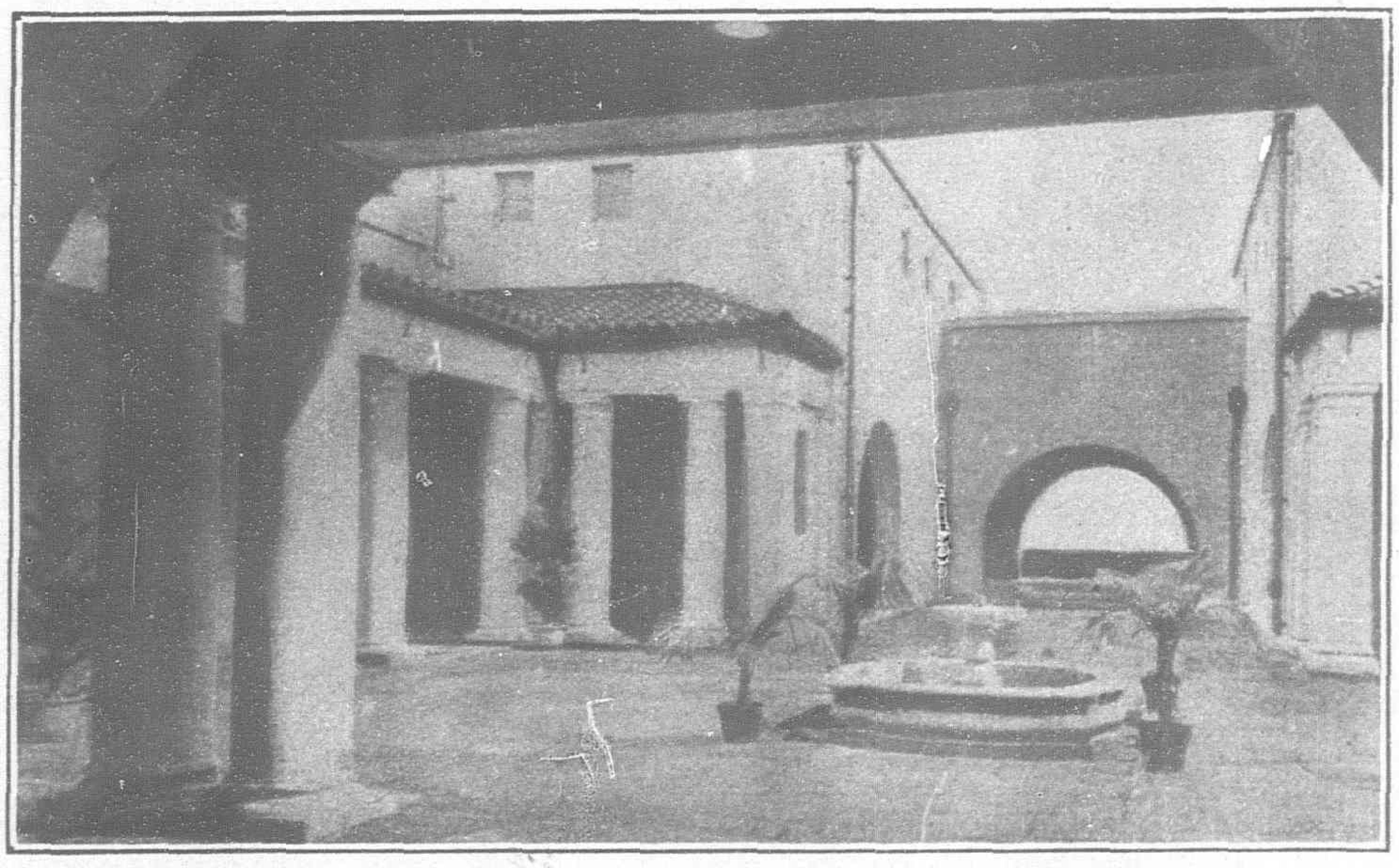


The Dining Room of the New Sumitomo Building on the Fifth Floor.



The Conference Room of the Sumitomo Partnership which Controls all the Sumitomo Enterprises.

1,650 tons of iron materials for posts and beams which are entirely covered with reinforced-concrete. Special reinforced-concrete walls surround at point of vantage, such as the elevator-shafts and stair-case rooms in preparation for possible future earthquakes. Each floor is divided by fire-walls into several sections; the elevator-shafts and the stair-case rooms are perfect fire-proof. The ventilation tubes and other holes for similar purchases automatically close as soon as the excessive heat works upon the fire-proof dampers. The fire-reservoir of the roof furnishes the fire-hydrants which are set up at several places with water; as soon as any one of the fire-hydrants begins action, it causes the instantaneous commencement of the operation of the high-pressure fire-extinguishing pump installed in the attached house of this building, creating pressure of 100 lbs. per square inch at the hydrant which is equipped at the highest part of the main building.



Spanish Portico on Roof of the New Sumitomo Building; Baron Sumitomo's Private Apartments.

Electrical Equipment

The Sumitomo Building received 270 k.w. from the Municipal electric bureau; the current is transfered at the transformer station of the basement of the main-building, and keeps the lights and power supplied. When the electric power gives out, the storage-battery automatically begins action so that the lights at main part of the building may not go out. This building has 30 motors, 340 h.p. for the purpose of operating elevators, electric fans, water-supply, drain system, etc. The number of lights totals approximately 1,200. Electric clocks are put up in each room and also at various other important parts.

The kitchen of the fifth floor is furnished with gas equipment.

The suction-tank of the attached house is connected with mains of the city water works, and from this tank, water is sent up to the two tanks put up at the sixth floor of the main building, thence it is led to the kitchen, toilets, and elsewhere.

Operating three boilers and two powerful pumps, which are installed in the basement of the attached house, the rooms of the main building are heated by hot water which passes through heaters.

Electrification of G.I.P. Railway

THE General Electric Co., Ltd., of Magnet House, Kingsway, London, England, and Witton Works, Birmingham, has recently received an important order for a high speed electric passenger locomotive, in connection with the electrification of the Great Indian Peninsular Railway.

This locomotive is for service on the main lines from Bombay to Igatpuri, and Bombay to Poona, both of which lines pass the Ghats.

The locomotive is of the 4-6-4 type, having three main driving axles arranged for individual drive and provided with a guiding bogie at either end. It is rated at 2,250 h.p. on the one-hour rating.

Each main axle is driven by a twin armatured motor through the intermediary of a flexible gear wheel, secured to a quill surrounding the axle. Torque is transmitted from the quill to the axle by means of a special type of flexible drive mechanism, which permits of relative motion between the axes of the axle and quill, thereby allowing the motor to be mounted rigidly in the locomotive frame, and reducing the hammer blow on the track to a minimum.

The three twin armatured motors are each rated at 750 b.h.p. on the one-hour rating, and are arranged for forced ventilation thus providing a high continuous rating.

The control apparatus is of the electro-pneumatic type, comprising contactors and cam switches, the control system being arranged to give series, series parallel, and parallel groupings of the main motor armatures. These groupings, in conjunction with the tapped field operation of the motors, give the locomotive very flexible speed characteristics.

The locomotive has been specially designed to give good riding properties at high speeds, the maximum designed speed being 85 m.p.h.

The Trend of Developments in Switchgear and Protective Systems for Large Power Schemes

By H. W. Clothier, M.I.E.E., A.M.I.C.E.

THE "Switchboard" of twenty to thirty years ago has given place to "switchgear" for large power supply systems. We have switchboard attendants, but the post of authority is that of the switchgear engineer.

Switchgear, in fact, has become a science in itself; a branch of electrical engineering into which a large body of men have been trained. It seems to make a call for some special trait in a man's character. Whilst many men are electrical engineers, not all seem to have the aptitude for switchgear. There is in switchgear a multitude of detail, a taste for which is only required by those possessed of considerable patience, and after long association.

True! switchgear started off simply enough. There was practically none when pioneers like Col. Crompton first began to work upon the commercial generation of electricity, but one day, when the power produced became considerable, an accident occurred, a bad short circuit was made, the supply failed, and the air in the station, he has told, was blue, "not only with smoke." Hence the necessity for the first automatic circuit breaking device, namely, the fuse or "cut out" as it is now to be called under B.E.S.A. nomenclature. When Dr. Ferranti out stepped the progress of his time by twenty years, in starting a large power station at Deptford, his switchgear was more like a diagram on the wall than anything we look upon nowadays. A single line of 10,000 volt busher broken with links, a series ammeter of the size we would put on a motor pillar, a long switch blade (little more than an isolating switch until Mr. Partridge later put an oil pot into the breaking circuit), a long tubular fuse, and finally a cable end and a line of earthed busbar.

It is a long jump from that time to the present, but let us face it in order to get some idea of what the practice for the corresponding purpose is to-day. For instance, Fig. 3 is a diagram of connections for a modern generator panel as used in a British super power station. This exemplifies to what the trend of switchgear and protective gear has led us. It is the key to the modern demand. It would be difficult to embody on the diagram all the working parts of the several appliances, but it is enough to say that every indicating, integrating controlling and interlocking condition that the consulting and operating engineers have found, by long years of experience, to be needed, have been invented down to the finest detail. Every misadventure of the past in operation, either human or mechanical, has been studied and an automatic remedy to prevent its recurrence has been introduced into this marvel of engineering, the switchgear which is represented by this diagram. Fig. 1 shows the apparatus made to this diagram.

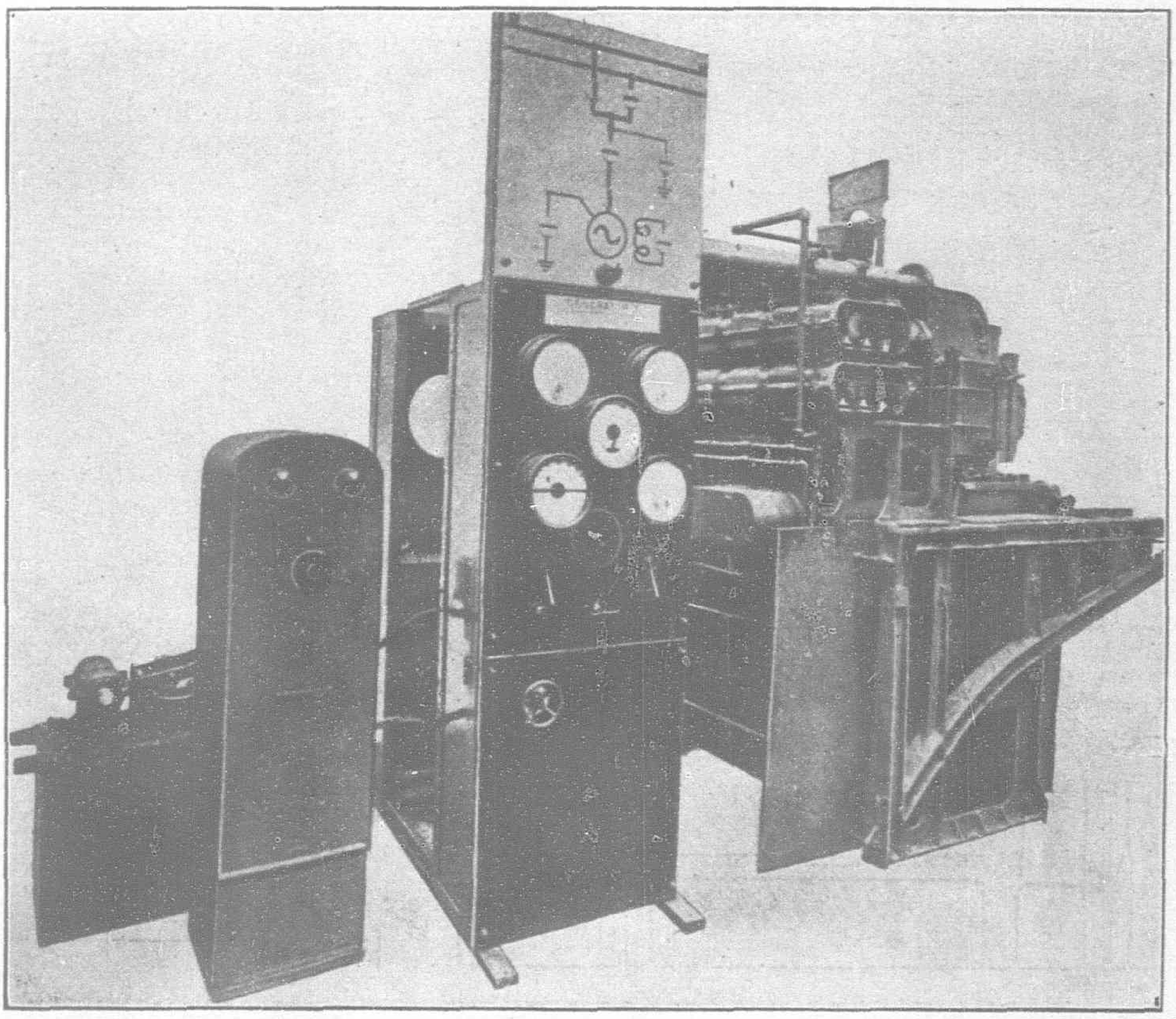


Fig. 1.—Photograph of the Actual Switchgear and Control Board. Shown Diagrammatically in Fig. 3.

The instrument maker, the relay maker, and the switchgear maker have produced these intricacies in answer to problems set in a long trail of specifications, one after another calling for this or that addition, each quite simple in itself, and woe is he who, having blissfully attempted to fulfil, has had one flaw in his product which prevents its promised function. What can be so annoying as a protective system which of itself needs more care and attention than it bestows upon its own rectitude? The demand has been so idealistically exacting, calling for a setting lower than ever before, or for a resistance at the neutral, so fine that it is a tax to secure stability with settings permitted by the limit set by the resistance or again, demanding a fine degree of accuracy of instruments and protection to be operated from transformers which, notwithstanding, must not have more than one primary turn; with the one hand reaching for that which requires a good margin of power, and the with other cutting down the power available to below the limit of previous successful experience. Thus constantly flow the demands to which modern switchgear makers have assiduously to submit themselves to design and manufacture, and which the switchgear operating engineers must maintain when the result is out of the manufacturers' hands. At this ripe stage of large power station supply it is surprising the large amount research yet to be accomplished.

Thus switchgear to-day is a congruous growth of appliances formed to meet the ideals of the users. Competition of the past years has been so keen that no producer could afford to pass by a new feature demanded of him. Each one, therefore, is kept in a state of perpetual invention.

The coming of super generating stations and super tension for transmission has provided plentiful incentive to the super initiative of the British engineer, and this initiative has been well directed towards the continuous running of the plant and the isolation of faults independent of the human element. The ideal of a continuity of supply to all consumers has been worked out in the power station and substations to a degree of perfection which has much simplified the manual operation. Indeed, in some cases, notably the automatic sub-station, it has been carried so far that the plant will start and run without attendants at all.

The standard of protection in Great Britain is to discriminate and instantaneously isolate a faulty section without interference with the sound sections, each section being in duplicate, multiple, or so arranged in the transmission network that any section can be cut out without causing cessation in supply to any part. This is usually achieved by one or other of the well-known balanced systems of protection. Relays function when the equilibrium of currents in the protection circuit is disturbed. No amount of short circuit current passing through a sound section must cut it cut, but it is essential that there shall be instantaneous isolation of the section on which the fault occurs. The problem of making protective systems immune from inadvertent operation on " straight through" or " through" currents, as the currents due to faults external to the protected part are called, still engages the attention of designers.

The demand for Ultra-sensitive settings frequently creates this risk of inadvertent and premature instantaneous automatic extinction of the main alternator field flux. It has been the experience that much damage may result to an alternator running on a fault within its windings, even when correctly isolated from the main bars, if the alternator field control is only by isolation on the *exciter* field circuit.

Several methods of dealing with the alternator field control on fault condition of the stator have been evolved, including field suppression devices in the exciter field circuit, and chemes for short circuiting or open circuiting the alternator field. Oil switches for speed in breaking have been tried. The field discharge resistances used so freely in the past in order to eliminate the intensity of the arc on breaking the inductive field circuit are dropping out of use, as they tend to prolong the duration of the alternator field flux. The solution for limiting the extent of damage is rapidity of isolation from the busbars and immediate damping down of the flux. The latter is accomplished by circuit breaker action without establishing abnormal voltage rise in the rotor winding by reason of the damping effect produced by the mutual path of the rotor core. The consequent currents in the core can be adequately dealt with by the alternator manufacturers. The ordinary circuit breaker without discharge resistance appears to be the simple method, and it has been adopted in many of the largest recent power stations. An emergency pillar, Fig. 2, conveniently placed by the alternator on the engine room floor or on the bedplate, contains the main field switch, which is interlocked with the main oil switch, to prevent its untimely operation before the main oil circuit breaker. A press button on the emergency pillar provides for the rapid isolation of the complete unit, opening first the main oil circuit breaker and then the field.

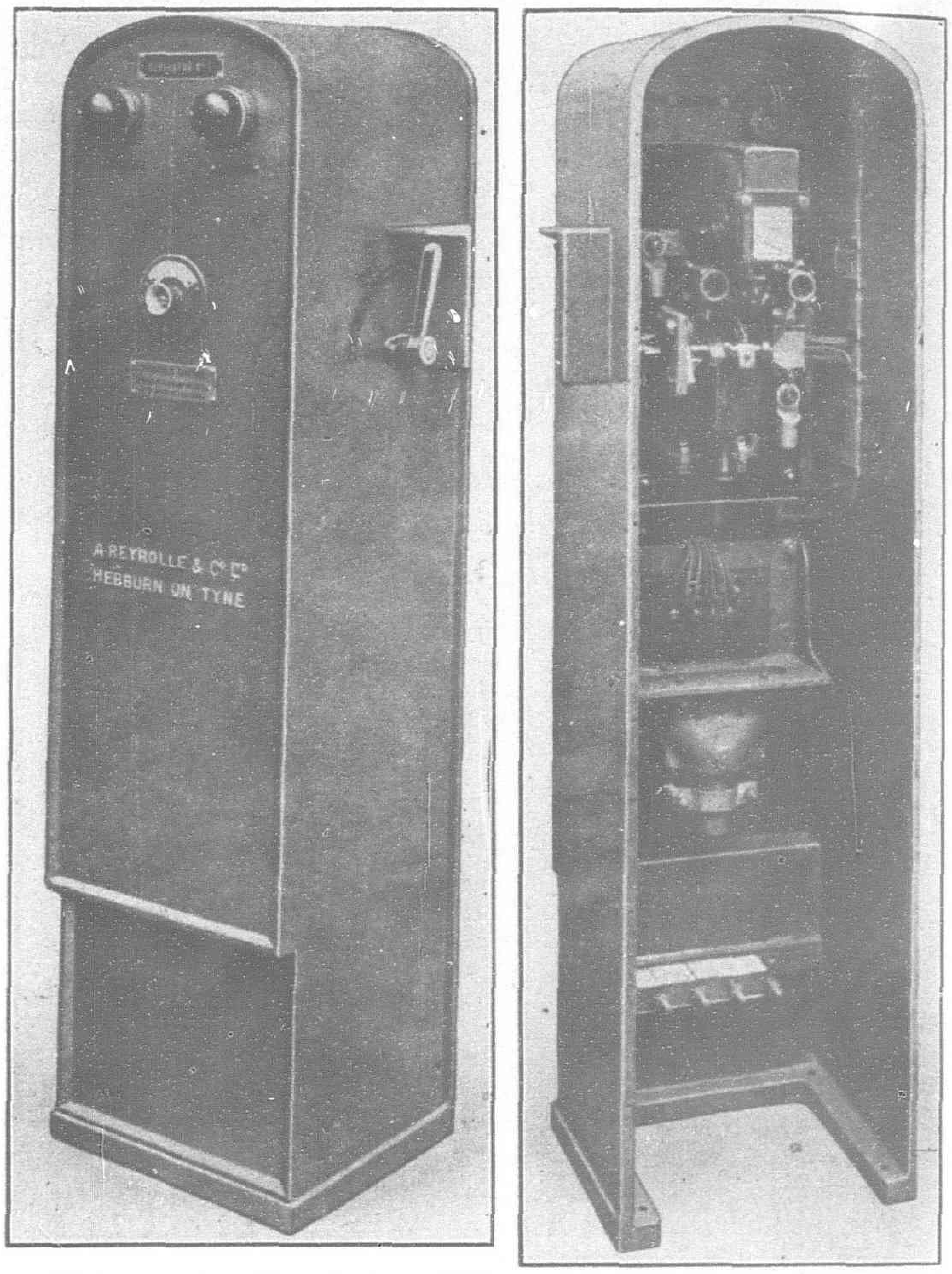
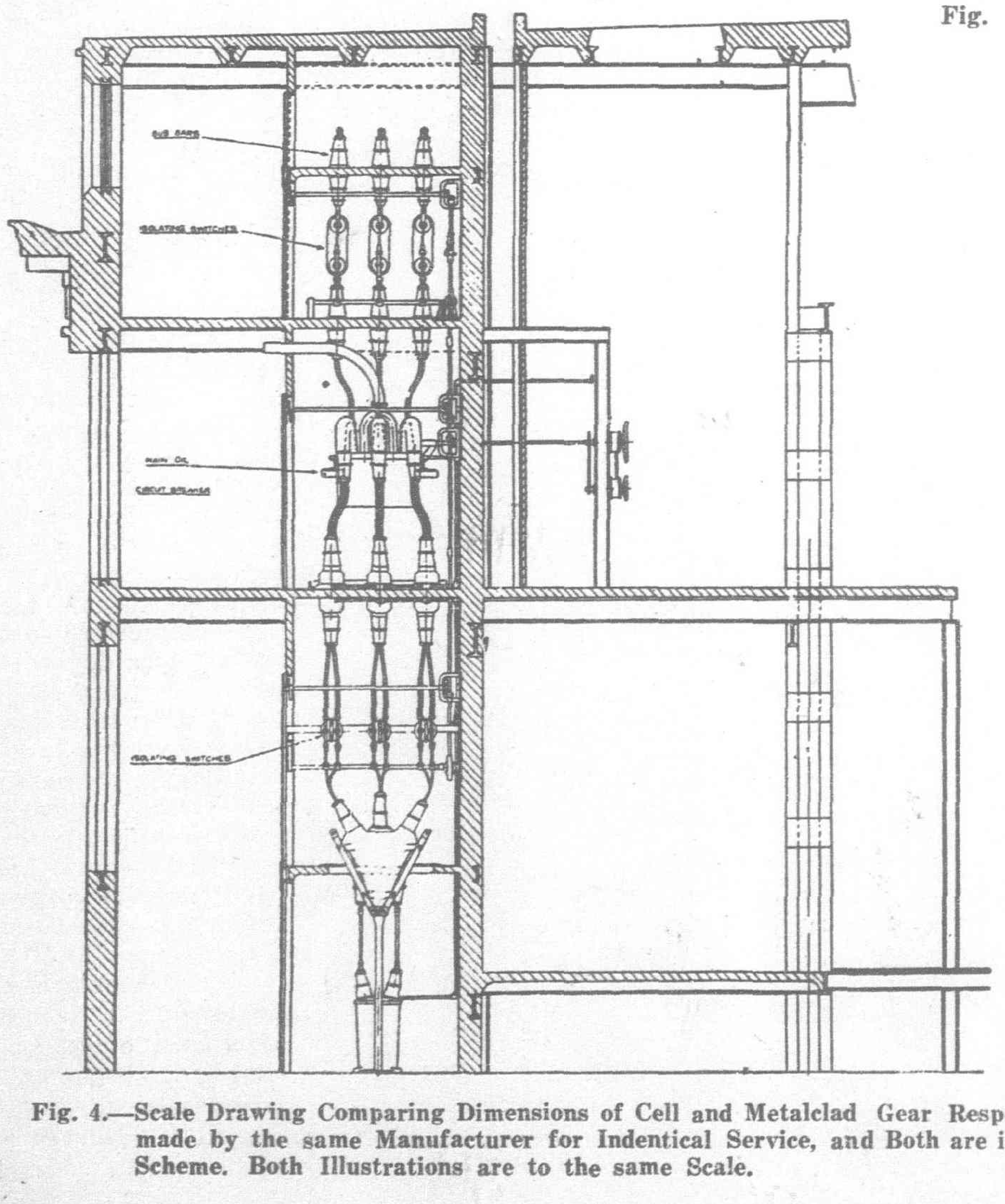


Fig. 2.—An Emergency Pillar with Circuit Breaker in Main Alternator Field Circuit Interlocked with the Main Oil Break Switch.

As to general lay-out of switchgear, the trend of the latest power station equipment is to sectionalise the switchgear, and in a few instances this has been carried to the extent of putting one or two sections into separate switch rooms, the complete and final switch house being practically divided into two main buildings with busbar section switches, sometimes with reactances joining between them. Two outstanding principles still remain in modern practice for the construction and support of the main conductors: one,



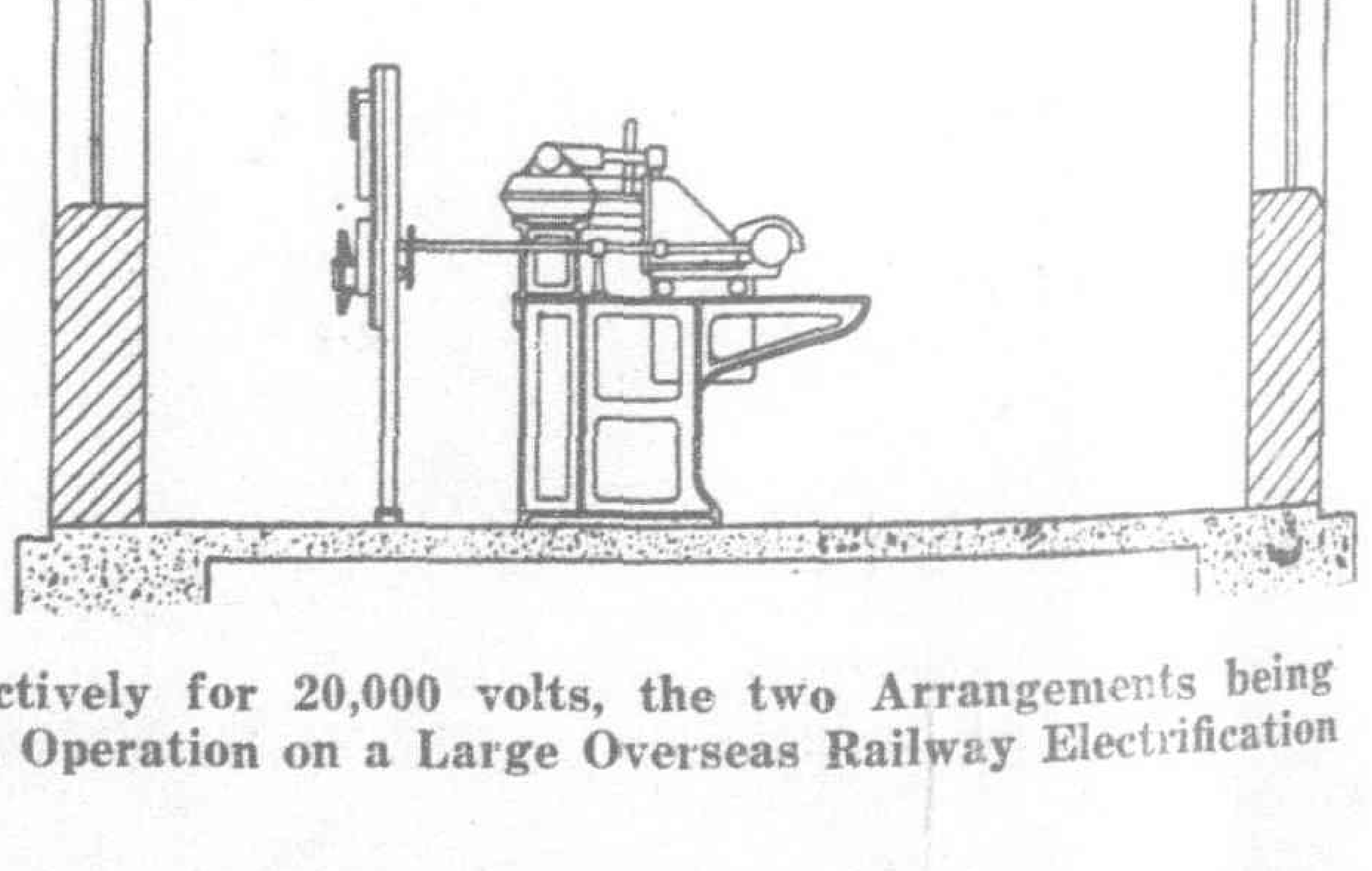


Fig. 4.—Scale Drawing Comparing Dimensions of Cell and Metalclad Gear Respectively for 20,000 volts, the two Arrangements being made by the same Manufacturer for Indentical Service, and Both are in Operation on a Large Overseas Railway Electrification Scheme. Both Illustrations are to the same Scale.

the cell construction with open conductors protected by doors and partitions, and the other, the enclosed metalclad compound filled. The "cell" type is said to be safe because, the conductor being visible, the danger is obvious; the "enclosed" because the conductors are inaccessible. The latter must be accredited entirely to British invention, since it is not to be found in the productions of the foreign switchgear manufacturers. It is noticeable and significant as a sign of the times that large manufacturers, who at one time only made metalclad gear for small mining and industrial service, now advertise it for large and important power circuits of voltages up to 33,000. On the other hand, there are many engineers to whom are entrusted the powers of selection of plant, who maintain that for convenience of repairs and operation the cell construction is to be preferred, as they may, without much trouble at any time, in an emergency or otherwise, obtain access to the bare conductors for the attachment of extensions, connections, or make adjustment and repairs.

Cell Type Gear

In the cell type gear, an illustration of which is shown on Fig. 6, the main supporting framework is in ferro-concrete or brickwork construction. Large clearances are allowed to avoid risks of arcing. To achieve this the gear is divided amongst compartments on separate floors with conductors supported upon insulators carrying them from one floor to another, and reducing the risk of fire and arcing spreading from one part to another. The construction survives from the earliest days of protected switchgear. In most cases of large power stations the switchgear is in a separate building, and so far as possible the phases are also separated. In addition to protection by the pigeon hole system of cells, the fronts of the several compartments are closed over with doors to prevent accidental access to the "open" conductors and in the more completely developed plans these doors are so interlocked with circuit breakers and isolating switches that accidental access to a live conductor is rendered impossible without deliberate interference with the intentions of the designer.

The need for interlocking enclosing doors and other means of access, to prevent accidental contact, and, even more important, interlocking of oil switches with isolating devices to secure correct sequence of operation, has been amply illustrated by past operating mistakes. The result is that the root principle of cell type gear, namely, the visibility of the conductors and ease of access in emergency for extension and repair, is being rapidly lost in the vital necessity to counteract operating mistakes.

Metalclad or armoured gear is of unit construction. All high tension conductors and insulators are completely surrounded by metal enclosure and either immersed in oil or run in solid with compound. Many forms have now been devised. Common to all types are two main components or sets of parts—the fixed part and the removable part. The fixed part includes the cable entry and busbar connections and sometimes the instrument transformers. The removable part carries the circuit breaker and mechanism which operates it. A form which has been adopted in five of the largest power stations in Great Britian is illustrated in Fig. 5. Here the whole of the removable portion is carried from heavy cast steel top plate, and after proper sequence of interlocked oil break isolating switches, it is vertically withdrawn upwards by means of an ordinary travelling crane, allowing a safe and convenient access to all the working mechanism and conductors of the circuit breaker. All removable portions have been made to jigs and gauges so as to be interchangeable for all panels of the same current carrying capacity. The busbar are also metalclad and compound filled, each busbar being separately contained within an earthed metal enclosure This principle of the complete and separate enclosure of each phas. is carried throughout the gear and applied to all high tension

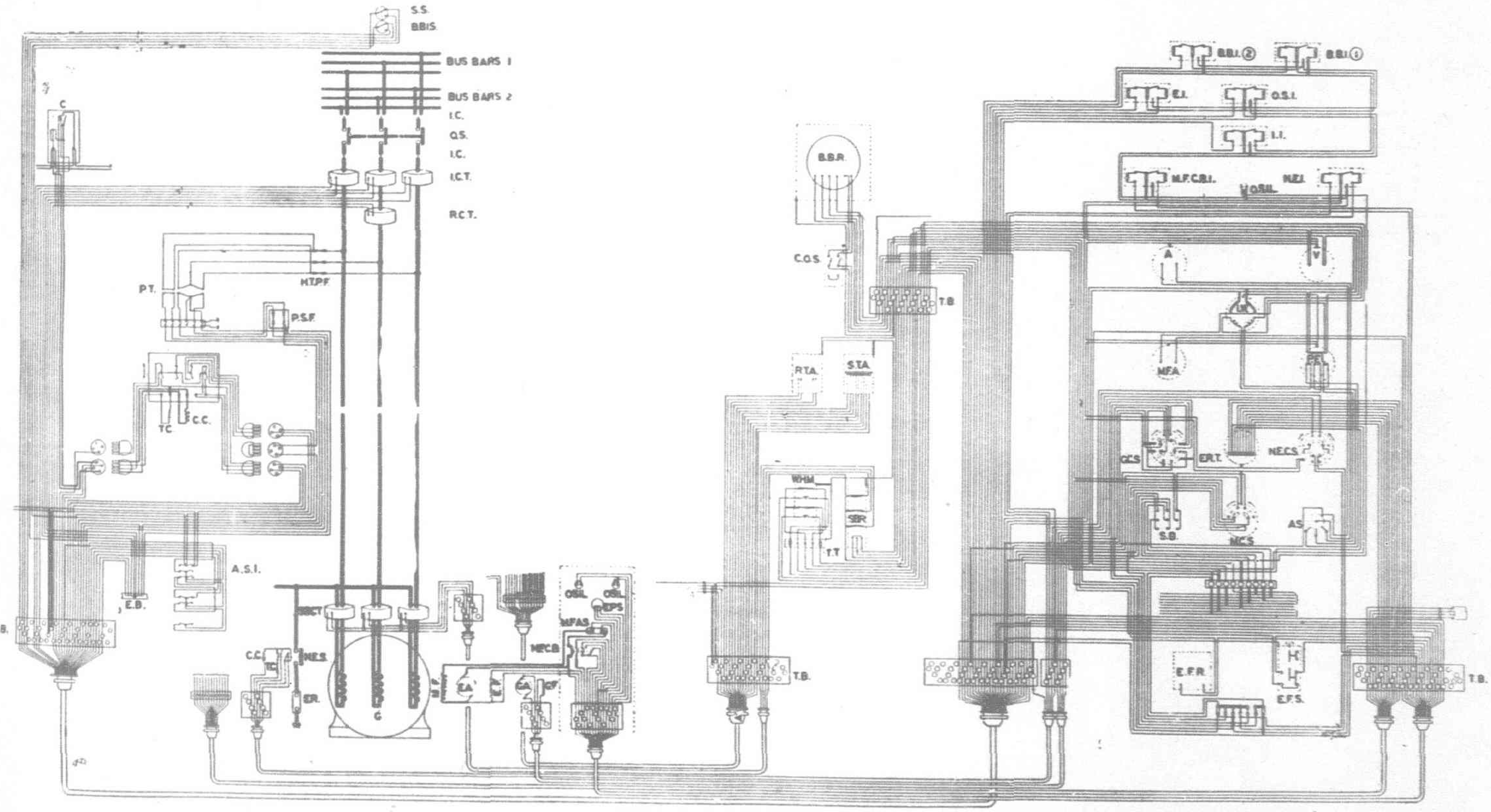


Fig. 3.—The complete diagrammatic lay-out of a typical-single set of equipment for one-generator in a large modern power station.

INDEX.

A.	Ammeter.
A.S.	Ammeter Switch.
B.B.I.	Busbar Indicator.
B.B.I.S.	Busbar Indicator Switch.
B.B.R.	Automatic Voltage Regulator.
C.	Contactor for C.C.
C.C.	Closing Coil.
C.O.S.	Changeover Switch for Regulator.
E.A.	Exciter Armature.
E.B.	Earth Bar.
E.F.	Exciter Field.
E.F.R.	Exciter Field Rheostat.
E.F.S.	Exciter Field Switch.
E.I.	Earthing Indicator.
E.P.S.	Emergency Push Switch.
E.R.	Earthing Resistance.
E.R.T.	Engine Room Telegraph.
G.	Generator.
G.A.	Governor Armature.
G.C.S.	Governor Control Switch.
G.F.	Governor Field.
H.T.P.F.	High Tension Potential Fuse.
I.C.	Isolating Contacts.
I.C.T.	Instrument Current Transformers.
I.I.	Isolating Indicator.
I.W.	Indicating Wattmeter.
M.C.S.	Main Control Switch.
M.F.	Main Field.
M.F.A.	Main Field Ammeter.
M.F.A.S.	Main Field Ammeter Shunt.
M.F.C.B.	Main Field Circuit Breaker.
M.F.C.B.I.	Main Field Circuit Breaker Indicator.
N.E.C.S.	Neutral Earthing Control Switch.
N.E.C.S.	Neutral Earthing Control Switch.
N.E.I.	Neutral Earthing Indicator.
N.E.S.	Neutral Earthing Switch.
O.S.	Oil Switch.
O.S.I.	Oil Switch Indicator.
O.S.I.L.	Oil Switch Indicating Lamps.
P.F.I.	Power Factor Indicator.
P.S.F.	Potential Secondary Fuses.
P.T.	Potential Transformer.
R.C.T.	Regulator Current Transformer
R.T.A.	Rotor Temperature Alarm.
S.B.	Synchronising Base.
S.B.C.T.	Self Balance Current Transformer.
S.B.R.	Self Balance Relay.
S.S.	Synchronising Switch.
S.T.A.	Stator Temp. Alarm.
T.B.	Terminal Board.
T.C.	Trip Coil.
T.T.	Testing Terminals for Watt Hour Meter.
V.	Voltmeter.
W.H.M.	Watt Hour Meter.
A.S.I.	Auxiliary Switches for Indicating.

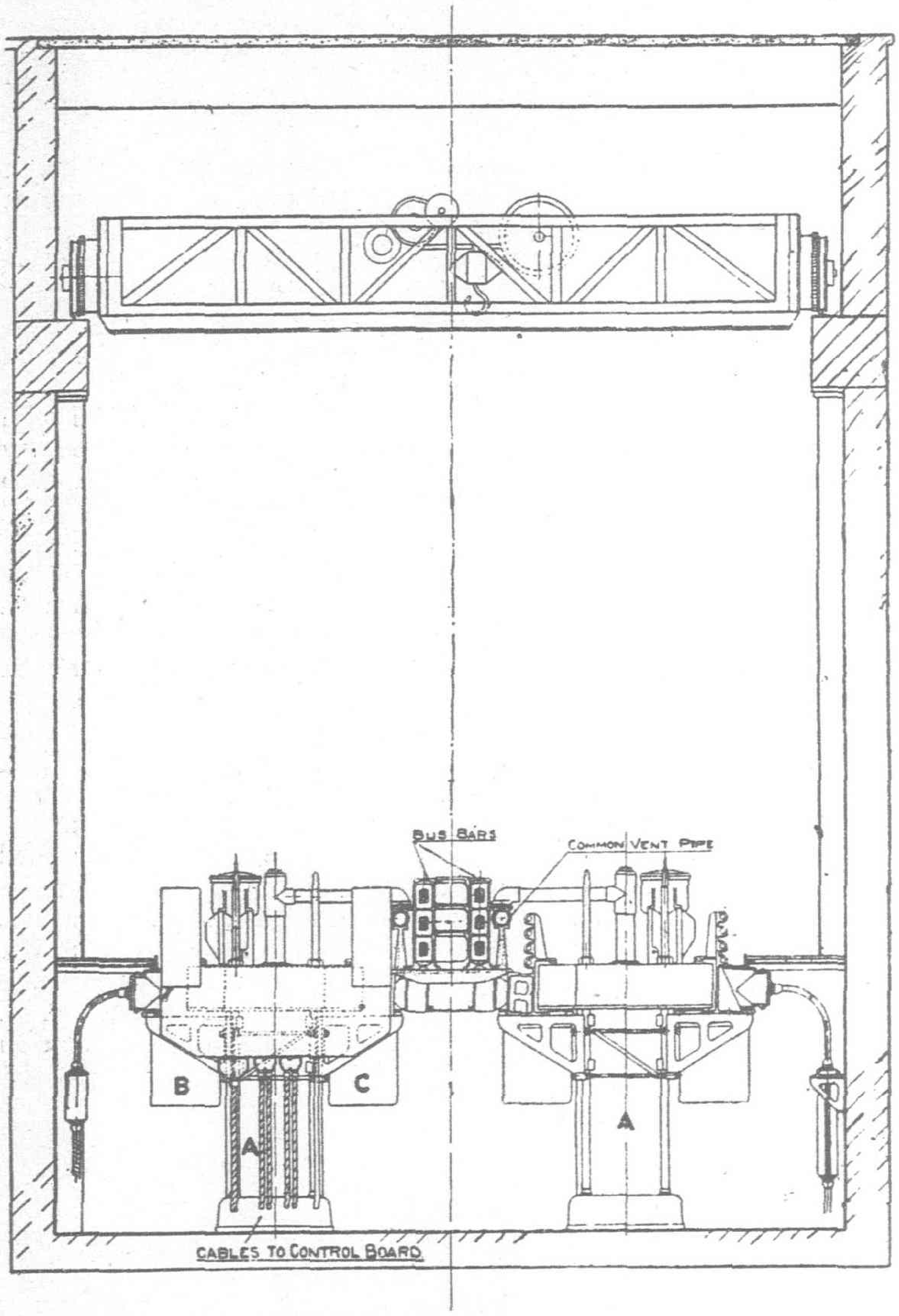


Fig. 5.—Section Through Switch House Utilising "Enclosed" Metalclad Switchgear with Switches of 1,500,000 k.v.a. Breaking Capacity, and Suitable for an Aggregate Plant of 150,000 k.w., about 70,000 k.w. of which is at Present Installed.

SAME SCALE AS FIG. 6.

conductors, so that the starting or spreading of an arc between phases only is thereby rendered impossible.

Fig. 4 compares the dimensions of building enclosure for the two types of gear for the same capacity and service conditions.

The present upward tendency in operating voltages and the need for mechanical support under short circuit conditions is tending to reduce the use of bare conductors in air with the attendant large leakage surfaces on the supporting insulators. The choice between the two types is now therefore narrowed down to the difference between a compact design, totally enclosed in metal, self supporting and relying upon the more solid forms of dielectric, on the one hand, and a design based upon a masonry structure, occupying much more space with comparatively long lengths of bare conductor carried in porcelain supports and entirely hidden behind locked doors, on the other.

The trend of the busbar voltage of large power station gear has taken an upward grade during the last few years. For example, Carville and Dunston (Newcastle-on-Tyne) were 5,750 volts, Needsend (Sheffield) 11,000; later stations—North Tees (Stockton-on-Tees) 11,500 volts, Dalmarnock (Glasgow) advanced to 20,000 volts, and Barton (Manchester) and Barking (London) to 33,000 volts, which is the highest so far. In the latter cases the generators are in unit groups with step-up transformers, there being no main switchgear on the lower tension side. On the whole this change is advantageous from the switchgear point of view, as it permits of the handling of greater energy without larger currents.

Heavy currents, such as 3,000 amperes and upwards, have set the problems of the avoidance of undue heating in framework by eddy currents, particularly on switch top plates and places where the conductors must, in all types of gear, pass through metal construction.

Insulation

British practice in insulation is along lines of utilising the great puncture resisting qualities of the bakelised paper with the good surface quality of porcelain, by enclosing the former within the latter and filling in the interstices with oil or compound. The time voltage characteristic of insulators, particularly those of a fibrous nature and when used on voltages of 20,000 and upwards, is now more carefully observed by insulator and switchgear makers. It has been realised that there must be no loophole for insulating materials which will make a show of a high voltage flash test, or test of short duration, but which will deteriorate with comparatively low voltages spread over a longer time, or will succumb to failure at such temperatures which may be occasioned by the passage of heavy current or normal heating losses in apparatus.

Breaking Capacity

The scope of this article does not include detail consideration on the breaking capacities of circuit breakers. In the past there has been a marked absence of facilities for testing on large plant, and, therefore, British makers have had to learn from practical experience on shore circuit conditions. Many instances of explosions, bursting of top plates and tanks, have directed the evolution of switchgear in the line of strong steel enclosure of the oil circuit breaking parts. One instance is on record where at one part of the switch enclosure the impulse pressure amounted to over 5,000-lb. per square inch. The evidence was most conclusively indicated by the deterioration of a circular steel baffle plate half an inch in thickness. This occurred on a switch taking the full effect of a dead short to earth on all three phases, practically on the busbars, with 70,000 k.w. of plant running.

The practice of using vents provides no appreciable relief for such sudden pressures. Vents which at one time were open and large have had to be baffled because they allowed so much oil to be discharged from the switch enclosure. But the system of free vent pipes is

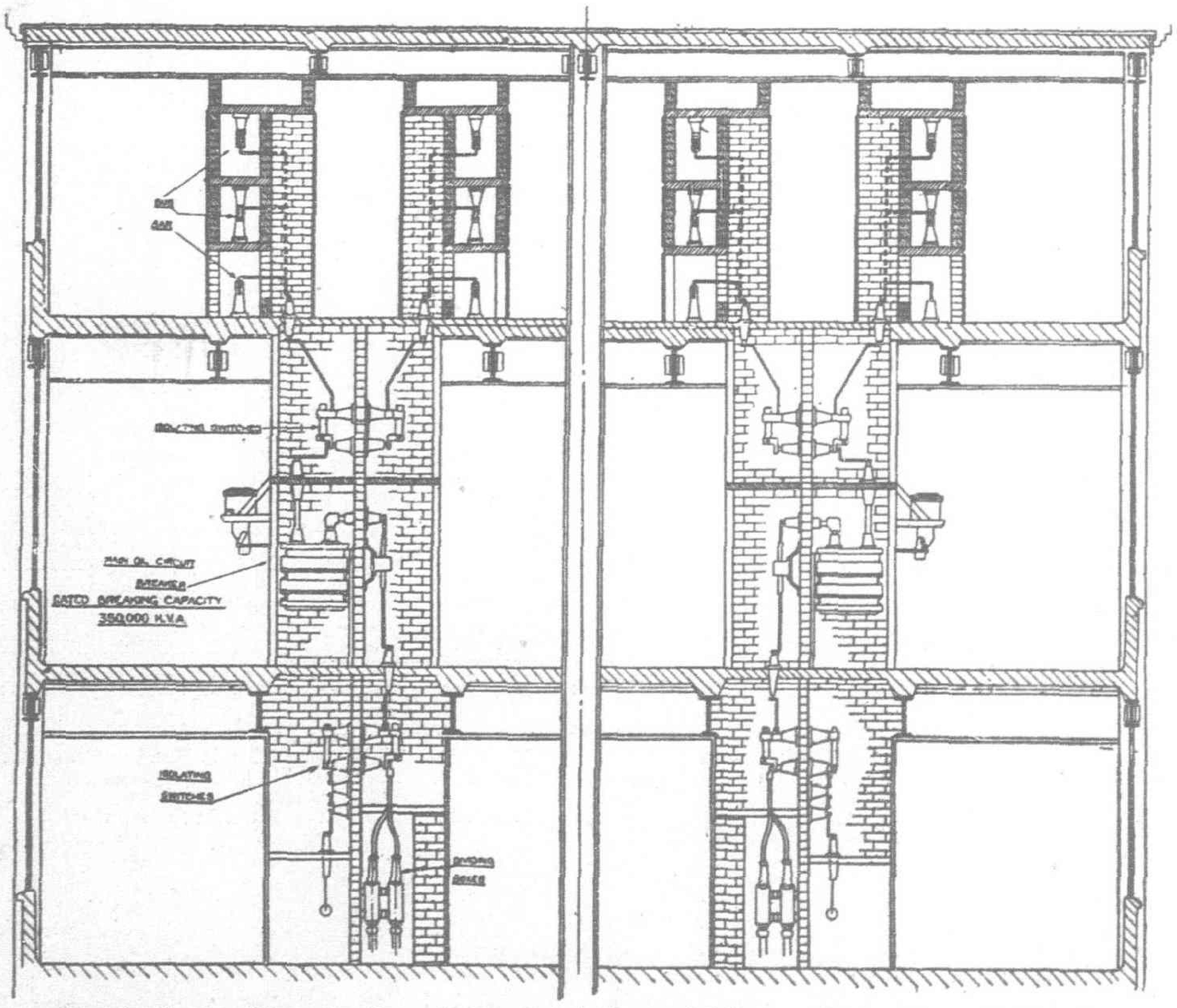


Fig. 6.—Section Through a Power Station Switch House of Cell Gear Construction with Circuit Breakers of 350,000 k.v.a. Breaking Capacity and Aggregate Generating Plant of 36,000 k.w.

SAME SCALE AS FIG. 5.

maintained in modern practice. It serves to exhaust the gases and smoke which are the product of combustion during circuit breaking. In order to avoid fouling the atmosphere in the switch room, these products must be conducted to the outside of the building. In the layout of some switch buildings this has been accomplished by straight pipes through the switch room wall leading direct to each circuit breaker vent.

In addition to the trend towards increasing the strength of the containing parts of circuit breakers to withstand the greater stresses occasioned by large arc energy in circuit breaking, attention has been given towards endeavoring to reduce the arc energy as a means of reducing stresses, such, for example, as attaining a higher speed in the separation of the sparking contacts.

Economy in Small Consumers Gear on Large Systems

Whilst attention continues to be lavished upon the main plant, there is certainly a trend towards less ambitious achievement in the protection and control of the supply to the smaller consumers. The need for saving in capital expenditure has squeezed the user to call for simpler apparatus, and the inventor to do with fewer parts. For example, a non-duplicate instead of a duplicate supply saves switchgear, cables and transformers. Such reduction in expense may be rendered more feasible with the improvements to be expected in the manufacture of transmission cables and static power transformers. Reduction in switchgear connections in such cases generally means throwing overboard the finer discriminating systems of protection. This, on the outlying sections of a large supply undertaking, is a reasonable risk. The erstwhile protection by oil break fuses comes into its own again in this economy campaign.

In general, outdoor switchgear has not made progress in this country. In some isolated cases the switch fuse in a metalclad form has been used out of doors. Experience here appears to be in favor of the provision of housing for switchgear, and the metalclad gear is an answer to the demand for economy in that it reduces the building to a minimum. Transformers with metalclad terminals may go out of doors to good effect, but switchgear with instruments and sensitive operating features is more comfortable when properly housed.

Co-Ordination

Thanks to the activities of the British Electrical and Allied Industries Research Association, tests on scientific bases have been made, and much helpful data may be forthcoming therefrom. The powers of the generating plant on which these tests have been made have been too small to expect to obtain information for dealing with large powers, more than what can be derived by comparison with the performances of small switches of the type used for mining and industrial services, so, notwithstanding the amount of research accomplished in this line, the British manufacturer must resort to the " ill winds" of the large power stations. Under the guidance of the British Engineering Standards Association, standardisation of switchgear progresses to the extent of formulating terms and definitions which tend to bring about a better state of definition for communications between the buyer and his sources of supply. The prospect of anything like interchangeability of parts of different makers made to a common specification is remote for large switchgear, although a general uniformity in the dimensions of switch tanks for given breaking capacities on small size circuit breakers is a distant tendency.

The much talked of British Proving House authority might also achieve something, if it were an established fact, in giving a hall mark in small switchgear, but, unfortunately, there are no signs of any forthcoming authority competent to place a hall mark on large power station switchgear, and so performance under times of stress is likely for some time to be the master criterion of quality.

Tsung Yang Electric Light Plant, Yangchow

THE Tsung Yang Electric Light Plant in Yangchow, Kiangsu province, is located at Chao Kwan Cheng Wait. It is now capitalised at $320,000. The manager is Wang Tah-ching. The plant is equipped with four engines, of which two are steam engines, one 250 h.p. and another 450 h.p., one is a coal gas engine of 148 h.p. and one is a fuel oil engine of 80 h.p. The capacities of the four engines respectively are 180 k.w., 300 k.w., 100 k.w. and 50 k.w., making a total of 630 k.w. The high tension wires are of 2,200 volts, three phase, three wires. The low tension wires are of 220 volts, three phase and four wires, both are of alternating current. The fuel oil engine alone, however, is of the single phase, two wires type.

The plant supplies about 15,000 electric lamps to public institutions, shops and houses. The charge per lamp is $1.20 for a bulb of 20 k.w. lighted from 5 p. m. to 2 a. m. The charge for the same lamp, but lighted for the entire evening, is $1.50. The charge for electricity, wherever meters are installed, is $0.20 per unit. Consumers applying for electric meters, however, are required to instal at least 10 lamps in the house, and every month are required to consume at least 10 units. If actually less than ten units is consumed in a month, the charge will be calculated at ten units. As no industrial enterprise in Yangchow is yet using electricity as a generating power, the hiring of motors is not yet possible.

It is said that many consumers in Yangchow steal electricity. There are many consumers who instal and pay for one lamp only, but actually they use four or five lamps. The company lamp is connected to a limiting mechanism by means of which no more lamps can be lighted at the same time with satisfaction. This is supposed to protect the plant, but in fact many of the laborers make it a business so to alter this mechanism for the consumers that more lamps can be lighted without any reduction in brilliancy. These laborers get $10 or $15 for this service and the consumers actually enjoy the advantage of more lamps. Such cases are not easy of discovery, especially in Yangchow, it is said, as many of the customers will not allow the inspectors of the plant to enter the interior rooms.

G. E. C. Contracts

The General Electric Co., Ltd., Magnet House, Kingsway, W.C.2., England, and Witton Works, Birmingham, have recently secured the following contracts for generators, motors, switchgear, traction plant, etc :—

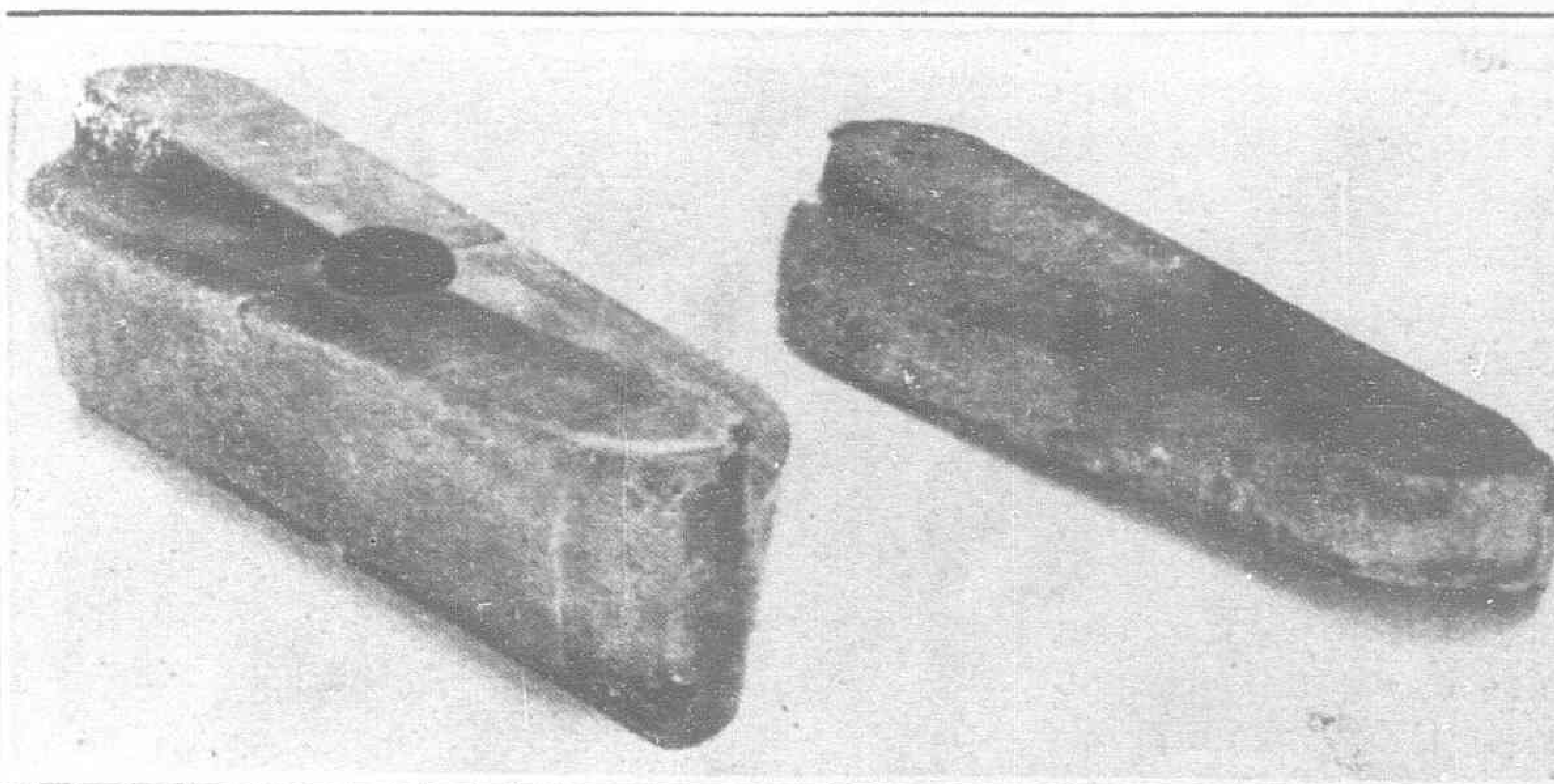
Further to contracts for generating plant and switchgear, the India Office has placed an order for two G.E.C. 500 k.w. 3 phase alternators, 3,300 volts, 50 cycles, 750 r.p.m. to be driven by Pelton turbines, for service on the Uhl River.

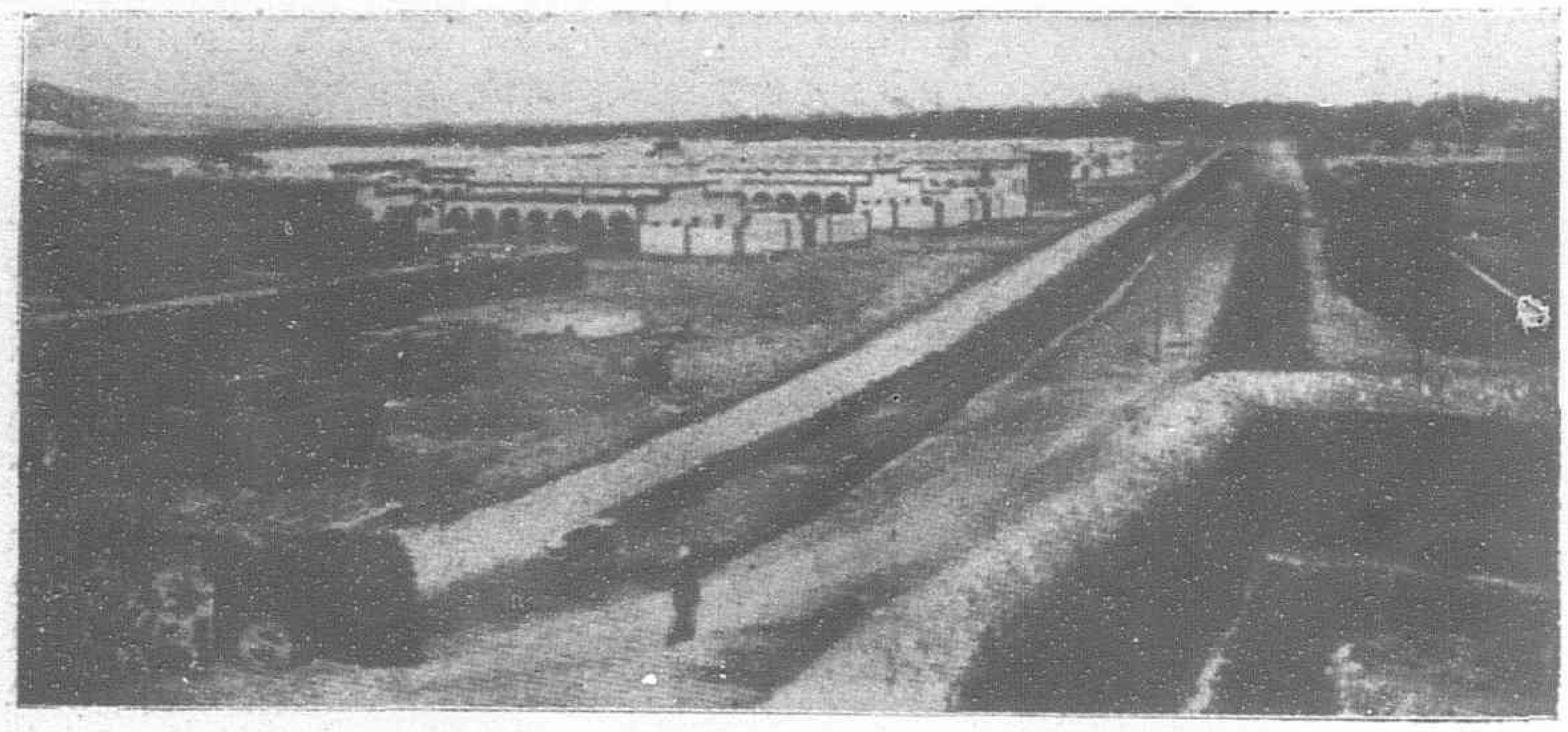
A Singapore Tin Mining Co., have placed an order with the G.E.C. for 1-120 h.p., 1-138 h.p., and 1-50 h.p., 3-plase induction motors, 400 volts, 50 cycles, 750 r.p.m. further to large orders for motors and control gear.

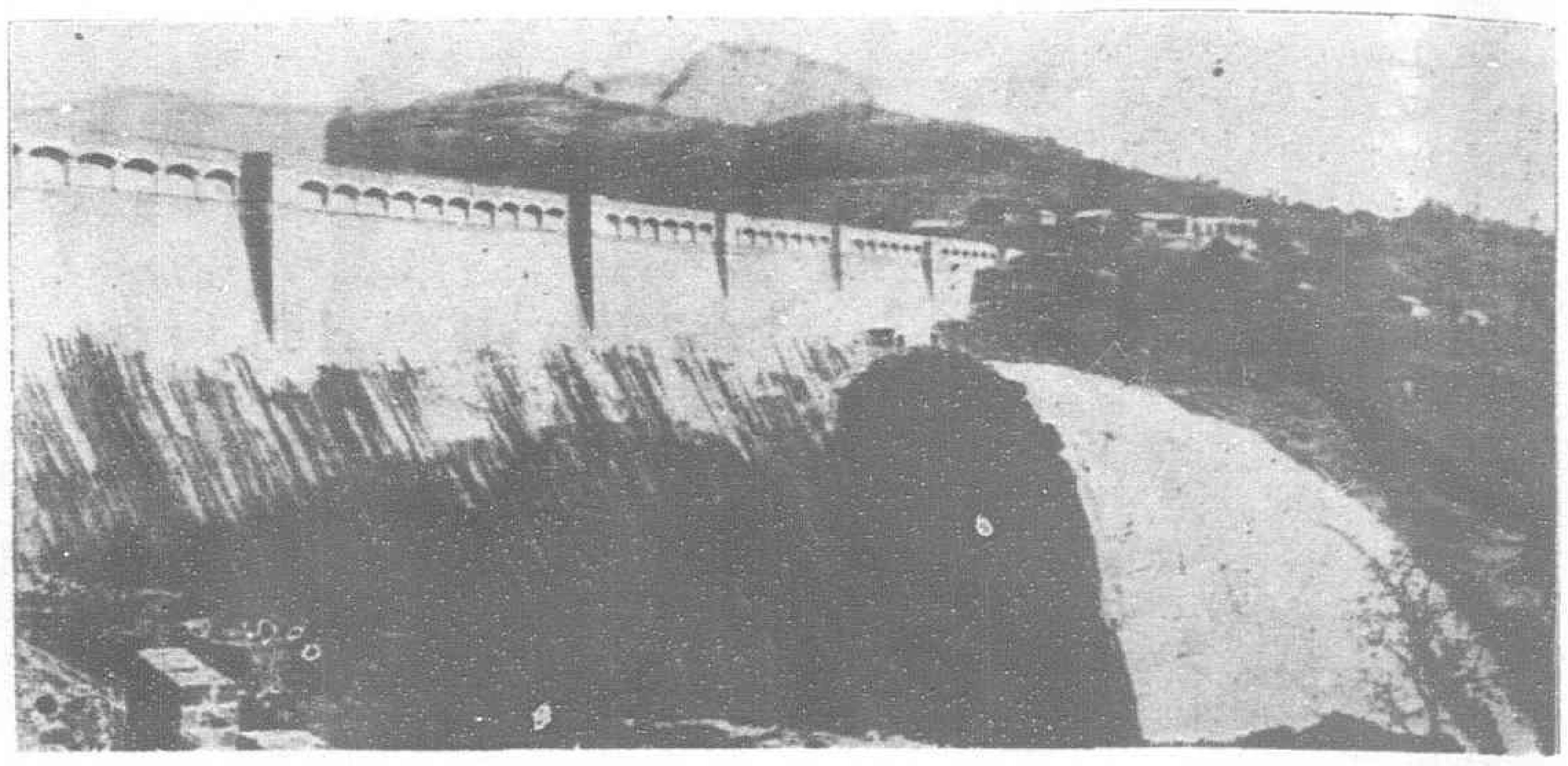
The South India Rly., Co., have placed an order for a G.E.C. steel plate cubicle with control panel, for mechanical remote control of a 2,000 k.w. outgoing feeder, 3,300 volts, 3-phase, 50 cycles, further to large contracts for E.H.T. Switchgear.

Performance of Class E. Carbon Tool Steel

The illustration below shows an oblong punch made from Edgar Allen Class E. carbon tool steel, and also the blank. This punch was used by a customer in the United States of America, for punching 13/16-in. material. It was in constant operation for six months and only broke when the holder became loose, not through any fault of the punch itself. The punch was sent by the pleased customer to the Edgar Allen Steel Co., Inc., Chicago, unsolicited, with the above information. The performance indicates adequately the high power of resistance of this steel, and its suitability for heavy punching.




Lloyd Barrage Circle. View of the Barrage Township at Sukkur


Lake Arthur Hill, Bhandardara Dam. Downstream Full View from South Bank

The Sukkur Barrage

Comprehensive Review of the Progress to Date

CRITICISMS appear from time to time in certain newspapers—usually in the form of editorial comment on letters from anonymous correspondents—regarding the Sukkur Barrage Scheme, either in its general financial aspect—declaring that the scheme must be a costly failure—or in the lack of energy alleged to be shown in its construction. The financial aspect of the scheme has been fully considered and debated from time to time in the Legislative Council and Government see no reason to modify the forecasts that have been made as to the complete success of this great scheme as a productive project. The criticism that nothing is being done can best be met by a brief description of the work that has already been accomplished, work not less exacting, not less vital because its results cannot always be seen on the surface nor concentrated at one particular place.

It is necessary first of all to visualise the immensity of the task to be accomplished.

The Secretary of State for India having finally sanctioned the Sukkur (now Lloyd) Barrage and Canals Construction Project in April, 1923, subject to the formal approval thereof by the Local Legislature, the Bombay Legislative Council resolved in June, 1923, to start the work of construction of the Barrage and the canals as from July 1, 1923.

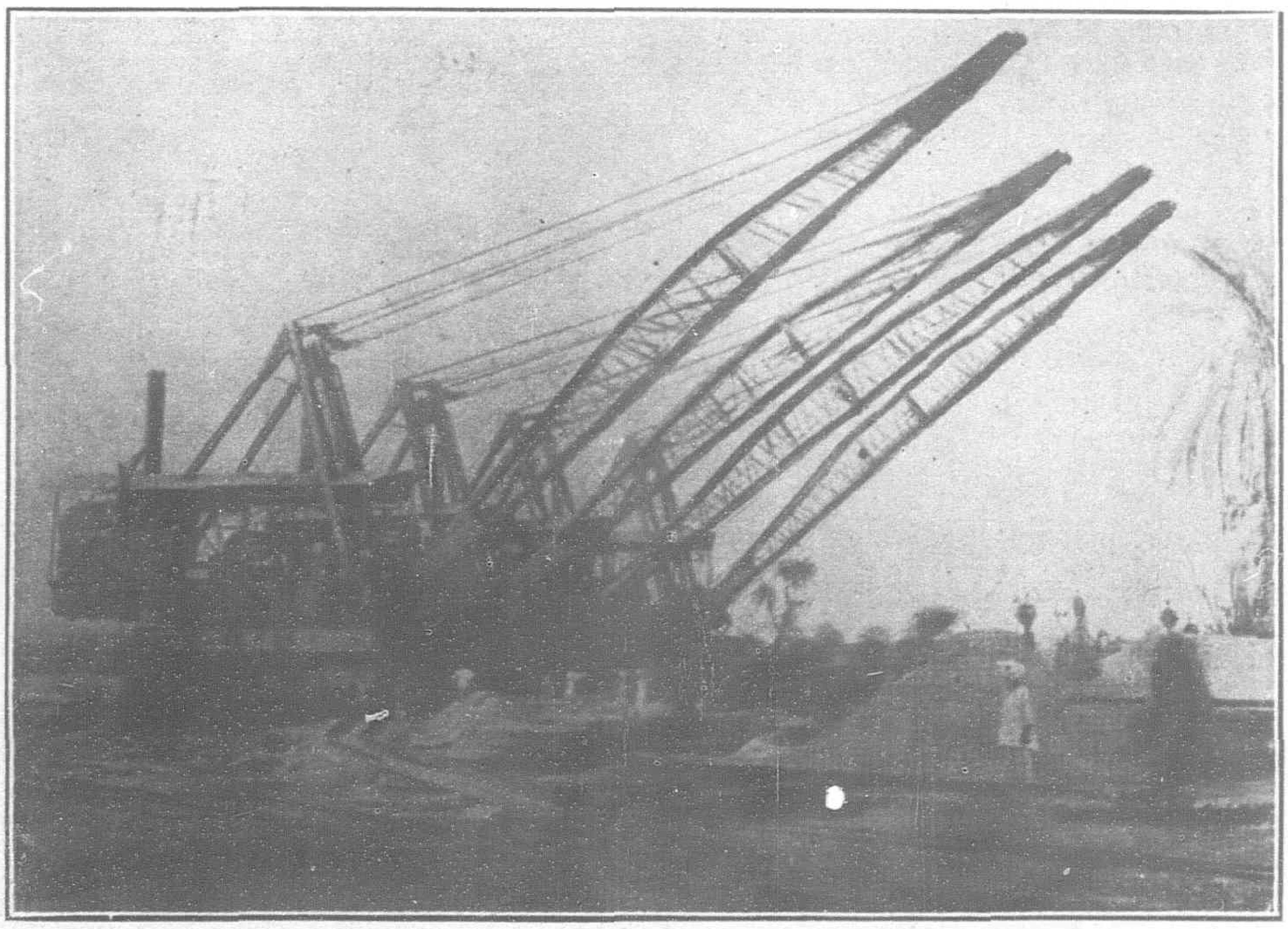
The scheme consists of the construction of a barrage across the Indus three miles below the gorge at Sukkur three canals on the right and four on the left bank with a separate head-regulator for each. The right bank system comprises the North Western Perennial, Central Rice and South Eastern Perennial Canals. The left bank comprises the new perennial Rohri Canal; a perennial supply channel to feed the Eastern Nara river and the canals dependent thereon and two feeder canals for irrigating lands in the Khairpur State. The Barrage under scientific control will give the necessary supply to each canal no matter how low the natural level of water in the river may be. All the canals taken together will command about 7½ million acres and enable over five million acres of crops to be irrigated annually. The total length of the main Canals and branches is nearly 1,600 miles and that of the distributaries 3,700 miles. The scheme is estimated to cost Rs. 1,835 lakhs.

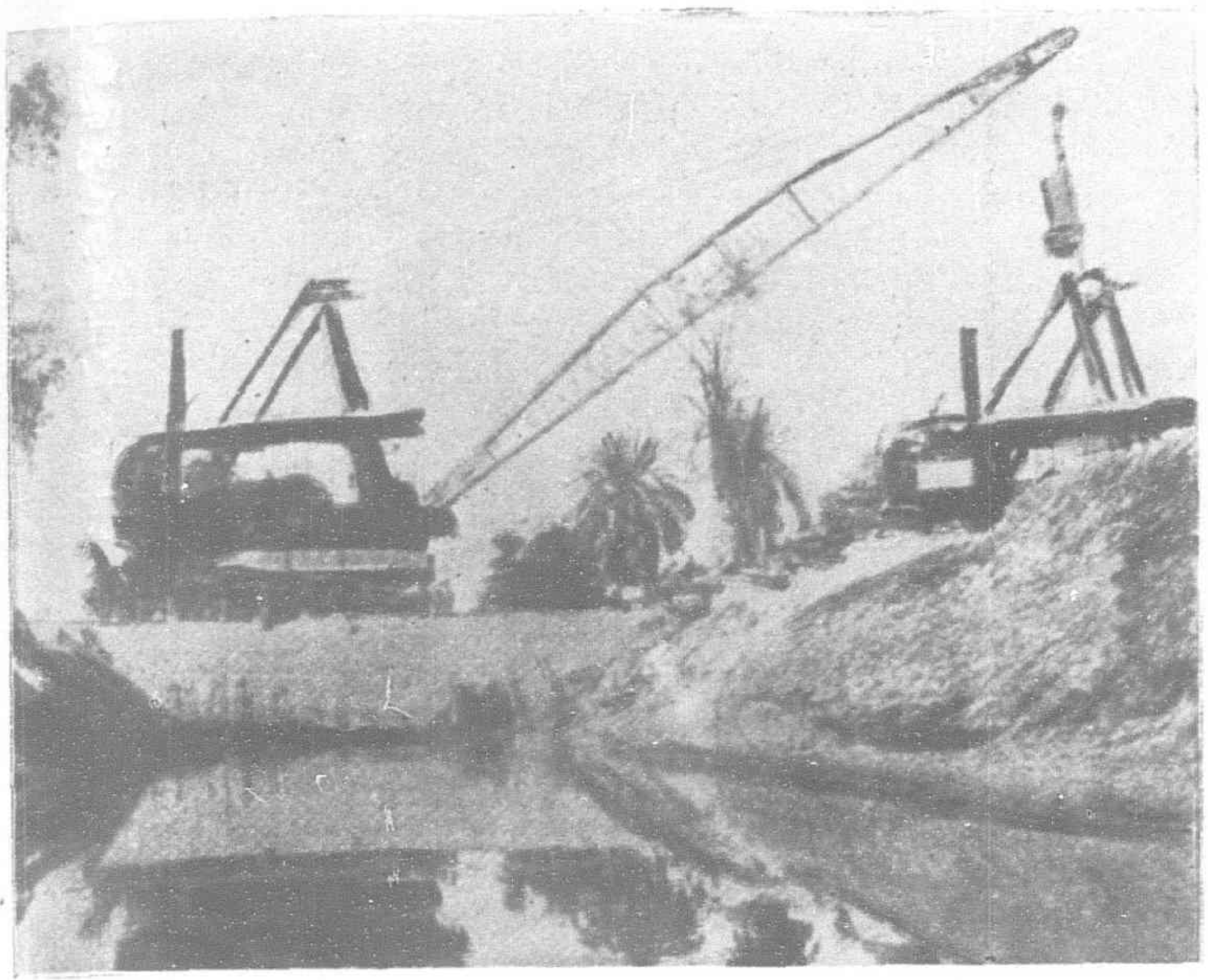
The scheme is divided into five circles of superintendence with a Chief Engineer at the head. The Superintending Engineer. Lloyd Barrage Circle, is in charge of the construction of the Barrage and the head-regulators over canals including the first 12 miles of the parennial channel to feed the Eastern Nara; while the remaining Superintending Engineers are in charge of canal construction.

The Lloyd Barrage Circle

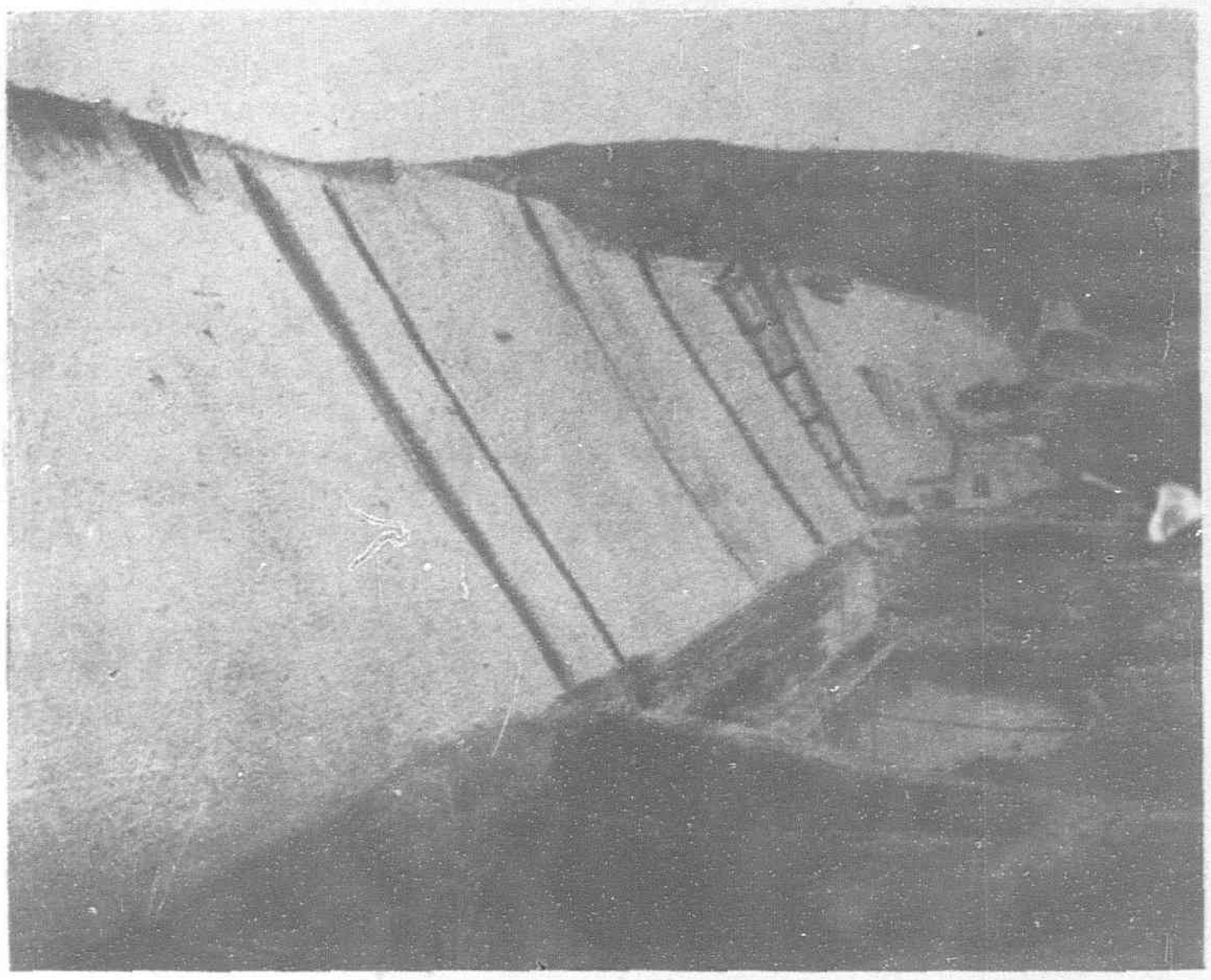
In the *Lloyd Barrage Circle* two townships (one on either bank of the river) have been constructed to facilitate the execution of works; the one on the right bank being larger than that on the left. It is essential to house the army of workers employed and to be employed on the scheme, and accommodation has had to be provided for all ranks of this great army. It is for this reason and this reason only that these townships have been built. Each township, which is provided with a Hospital, Bazar, Market and Institute, will when the buildings in hand are fully completed, provide accommodation for 18 officers, 242 subordinates and 340 menials, etc. close to the site of the works. In addition, cooly lines are being constructed for the accommodation of semi-skilled labor on both banks of the river. Two large blocks of office buildings on the right bank to accommodate all officers who have their headquarters at Sukkur and a smaller block of offices for Sub-Divisional offices on the left bank are in course of construction.

The personnel to be provided for may appear large, but it is small compared with the multitude that


Four Machines Ready to Start on their Journey to the Site of Work



Dragline Excavators Crossing Sukkur Canal on a Bank 16 feet high, Pierced with 6 'armco' Pipes 36-in. in Diameter to Carry the Canal Discharge



Lloyd Dam Showing Outlet Pipes

would have had to be employed had not the fullest use been made of the resources that modern inventions have placed at the disposal of the engineer in the way of labor-saving devices. Machinery is replacing man-power wherever possible, and just as the health of the workers has to be cared for by the doctors and hospitals of the township, so the efficiency of the varied types of machinery to be used in the construction of the Barrage and its attendant canals requires the constant skill and attention of expert workers.

Generating Station Quarries

A large electric generating station has been erected on the right bank with 6 Diesel engine alternator sets, with the necessary switch boards, oil storage and cooling plants, to provide electric energy for running the plant to be used on the construction of the barrage and for workshops. The power will be generated at 6,600 volts and transformed to 400 volts for use on the works where it will be utilised in running land and floating cranes, concrete block yards mortar mills, air compressors, stone dressing shops, pumping plant, workshops, etc. The power is carried across the river by a submarine cable in duplicate. The overhead distribution in the works area and townships is practically completed.

Three quarries have been opened each with its own power plant for compressed air and necessary pneumatic tools, workshop, store shed, dispensary, works water supply and housing accommodation for the subordinate staff and labor. The Sukkur Quarry produces rubble stone and has supplied all the stone for building operations on the right bank for the construction of guide banks and roads, lime burning, etc. The collection of a large reserve stock at the quarries for further requirements is in progress. The special large sized stones to be used on the Barrage and regulators will be obtained from the Rohri Quarry. For the removal of large blocks of stone from the solid mass in the quarry a channelling machine and a number of wire saws are in operation and these blocks, cut direct from the hill side, are transferred by cranes on trucks of the Barrage Railway to the stone-dressing shop on the left bank works area where they will be cut to required sizes and dressed by machinery ready for building into the work. All the quarries are connected to the works area by broad gauge track and stone for building, lime burning, etc., is loaded into trucks at the quarries and brought to site of works, kilns, etc., as required with a minimum amount of manual labor.

Two Guide Banks have been constructed, one on each side of the river, the right bank guide commencing from the end of the Sukkur Bunder downstream towards the barrage and the left bank reaching from the Lansdowne Bridge to the Barrage site. Both banks are pitched with rubble stone. A metalled road has been constructed along the right guide bank and a broad gauge railway track joining the Rohri Quarry to the workshops area is laid along the Left Guide Bank.

Its Own Railway System

Some idea of the magnitude of the preliminary work that has been undertaken may be obtained from the fact that it has entailed the construction of a complete railway system to deal rapidly and economically with the vast mass of material that will have to be handled.

For delivery and moving of materials plant, etc., a network of broad gauge railway lines has been laid in the works area and quarries on both banks. About 30 miles of line and sidings have been constructed and are in use. These lines take off from the North Western Railway lines at Sukkur and Janvri Stations so that trucks can be brought from the North Western Railway on to the Barrage Railway system and unloaded at any point as required. Up to date 8 locomotives and 450 waggons of various kinds have been purchased from the North Western Railway and 6 new highsided waggons and 30 tipping waggons have been purchased from abroad. Locomotives running sheds and high service water tanks have been constructed on both banks of the river for the overhauling and cleaning of locomotives and rolling stocks.

On each bank of the river a well equipped workshop with electric power has been erected and fitted for repairs and maintenance of the plant used in construction. Each shop has a small foundry attached to it. The workshops also carry out repairs to machinery employed in other circles.

Engineering science and experience has now proved that a barrage can be as securely built on sand as upon rock. Concrete will play a big part in this result and the preparations for its use have entailed a great deal of preliminary work.

On each bank a concrete floor measuring 600-ft by 52-ft. has been laid down on which large concrete blocks for the river bed protection measuring 10-ft. by 5-ft. by 3-ft. and 5-ft. by 3-ft. by 1½-ft., will be moulded. The necessary cranes, machinery and moulds for making the blocks which have been ordered are expected shortly and as soon as erected will be set to work.

Widespread Preparation Works

Nor is this all that has been done or is being done at the site of the Barrage. The following paragraphs describe a few of the processes in the preliminary organisation which have to be completed before the first stone is laid on the bed of the Indus.

On both banks of the river, high service tanks have been constructed and water is pumped up to them from the river and distributed over the works area by mains. Storage and high service oil fuel tanks for locomotives are erected at suitable positions over the area at which the locomotives, all of which burn oil fuel, can be easily replenished.

For loading the barges with the various materials used on construction each tank is being provided with a wharf. The wharves will carry a double track of broad gauge railway connecting to the works railway.

The two dredgers required for excavation of foundations in the river have arrived at Sukkur and the pontoons, floating pipe lines, etc., required in connection therewith are practically completed.

Six sets of floating pile-driving plant with two double acting steam piling hammers and three with two-ton steam cranes, all complete on pontoons 77-ft. by 33-ft., have been erected. Materials for six units of floating pumping plant consisting of 6 pontoons 36-ft. by 13½-ft. each carrying three 8-in. centrifugal pumps directly coupled to electric motors have arrived and are in course of erection.

Exhaustive experiments have been carried out in the production of 'fat' and hydraulic lime from local lime-stone and large concrete blocks for experimental purposes have been made.

We have dealt so far only with the operations in and about Sukkur. At the headquarters of the four Canal circles vast schemes of canal construction are being worked out and far out in the Sind desert men and machinery are giving practical effect to them.

The four Canal Circles have been occupied mainly in ordinary and contour surveys, designing of canals, acquisition of land for canals and construction of buildings and the assemblage and putting into commission of mechanical excavators for excavating the main and branch canals. The designs have been prepared for practically all the main canals, branches and major subsidiary channels and excavation is being carried out with 22 excavators of various sizes. Seven more mechanical excavators are in course of erection. The use of these mechanical dragline excavators is not merely an engineering, but also an economic problem, as the existing supply of labor for agricultural purposes is interfered with to the least possible extent. Another important aspect of the utilisation of this heavy machinery is that it has prevented the formation of a labor ring thus keeping down the labor rate. This is very important in an undertaking where labor costs must in any case be a large proportion of the total initial outlay. Another equally important feature of the machines is that they can be worked daily for 24 hours for 5½ days a week and also during the hot weather months when it is almost impossible, owing to the intense heat, to do any earthwork in Sind by manual labor. Conditions on the machines during the hot weather are made tolerable by the liberal provision of electrical fans. Powerful electric lights enable work to be done at night and the electric current for these and the fans is generated on the machines.

In addition, some work of canal excavation has been given out on contract to manual labor at rates lower than those provided in the project estimate.

Huge Dragline Excavators

In the *North Western Circle* the four dragline excavators have excavated the North Western Perennial Canal with a bed width of 164 feet and depth of 10.2 feet in a length of 12 miles. A start has also been made on the Central Rice Canal with a bed width of 250 feet and a depth of 11.75 feet and also on the Shahdadkot Branch of the North Western Perennial Canal by means of two small machines. The total quantity excavated in this circle to date is about 7 crores cubic feet.

In the *Western Circle* owing to the peculiar nature of the country through which the South Eastern Perennial Canal will pass, it has been decided to carry out the excavation of this canal partly by mechanical excavators and partly by manual labor. The contract for manual labor has been let and the contractor has completed more than half the work allotted to him. Small excavators are also employed on the tail portion of the South Eastern Perennial Canal and the Warah and Johl Branches. The work of excavation of canals in this circle will be in full swing shortly. The total quantity so far done approximates 3½ crores cubic feet.

In the *Rohri Canal Circle* a total length of about 6 miles of the Rohri Canal, 4 miles of Khairpur Feeder East and about 12 miles of Branch Canals have been excavated. The total quantity excavated is about 8½ crores cu.ic feet of earthwork.

In the *Eastern Nara Circle* the excavation of the Khipro Canal ex: the Eastern Nara has been completed in a length of 4 miles and the work of other branches will commence as soon as the four new machines which have arrived are completely erected. To prevent wastage of water through 'Sangs' (depressions) banks are to be provided on both sides of the Eastern Nara from Rohri right down to Farash near Dhoro Naro Station out of which a length of about 45 miles from Makhi Weir to 14 miles above the Jamrao Canal head will be completed before the coming inundation season.

To facilitate inspection in this inhospitable region, paths 12 feet wide are being provided along the Nara from Rohri to Makhi Weir. Both these works are being done by manual labor. The total quantity of earth-work done is about 6 crores cubic feet. The total quantity of excavation and earthwork done up to date on all the canals is approximately 25 crores cubic feet which is equivalent to the removal of a cube of earth 630-ft. long 630-ft. wide and 630-ft. high.

Many buildings have been constructed at scattered places all over the area to be commanded and it is hoped that next year will see the programme of buildings required for the housing of those employed on these works practically completed. Side by side with the engineers the civil administration has been at work at the big task of acquiring the land required for the canals, etc.

Land Acquisition

Land acquisition has been completed to the extent of some 11,000 acres. This is a large area, but it is only a small part of the most extensive acquisition work ever done at one time in one province. The acquisition of agricultural land in districts, where rents are shares of the crop if there is one, farm accounts are useless or do not exist and sales are often fictitious, is a science which has no text book and no recorded experience of any real value. It was therefore necessary to invent a system and adopt it to meet new difficulties as they arose. This process is now fairly complete and the work, which was slow at first, is progressing more rapidly every day. What was formerly a series of problems is now an elastic routine.

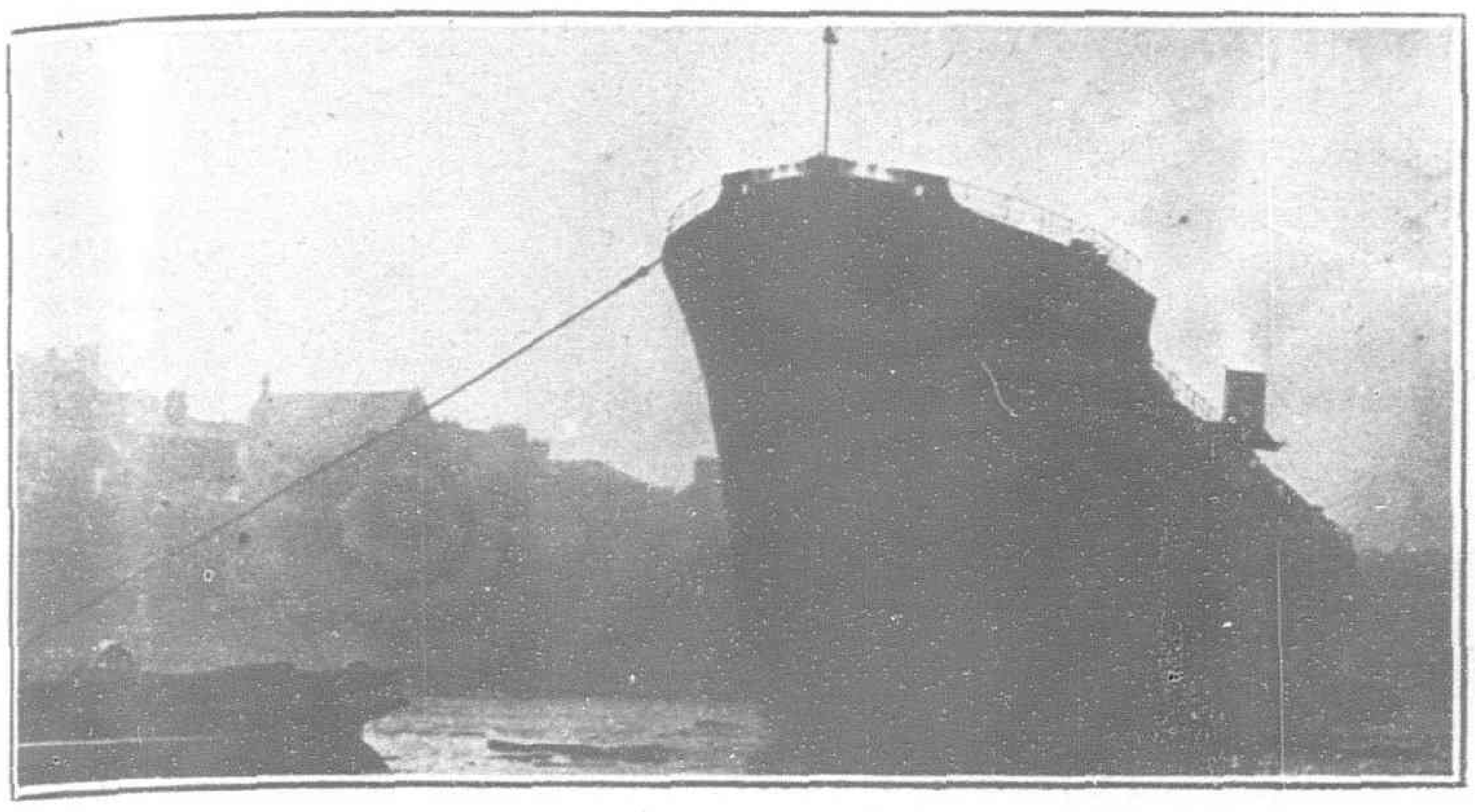
On 3,195 awards there have been 176 references to the District Court in two of which the awards have been sightly enhanced. The court work was heavy at first but, although far lower prices are now being paid, references are now few.

The total expenditure incurred up to the end of March, 1926, is approximately Rs. 3.76 crores.

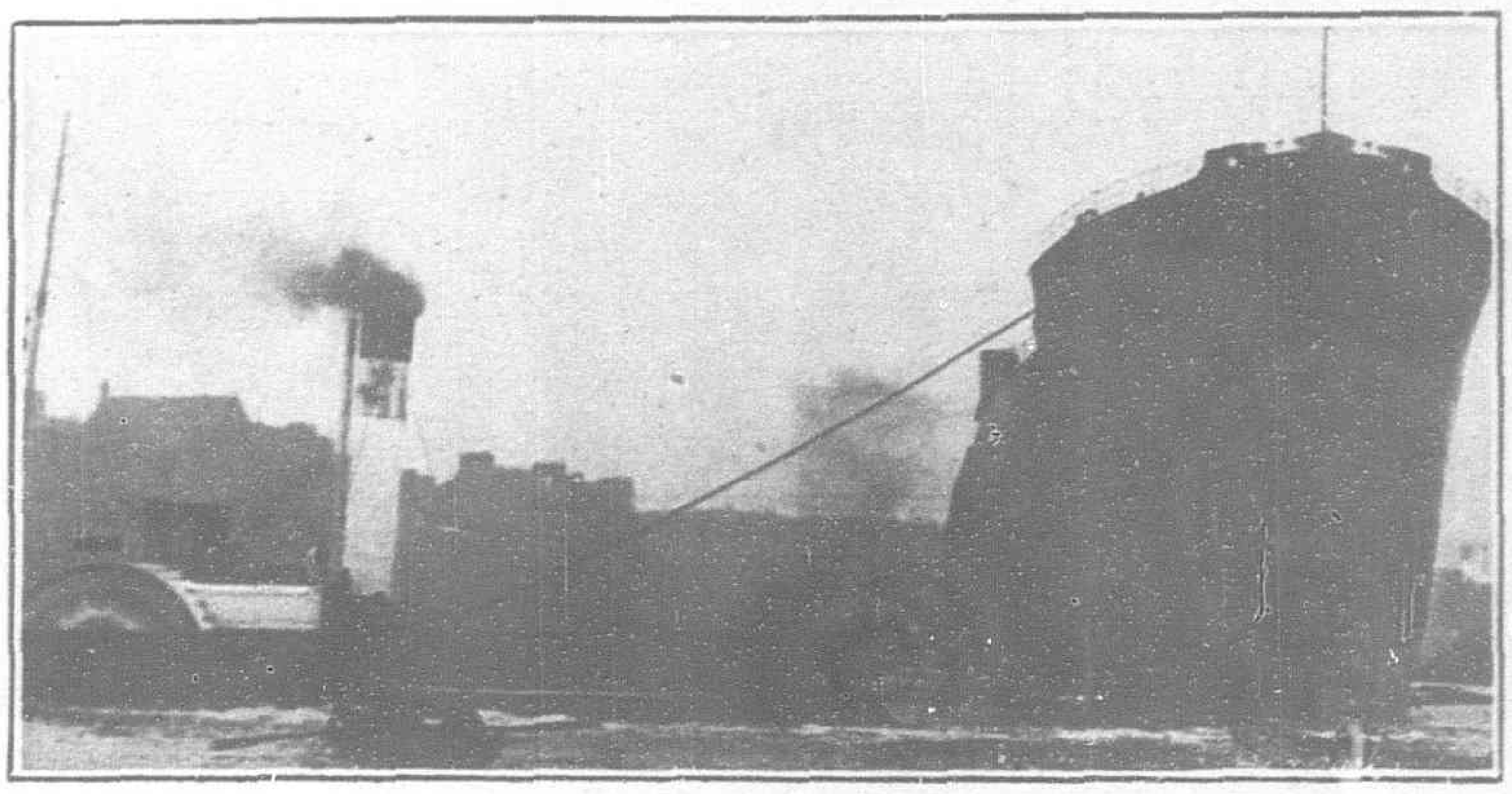
The above paragraphs give in brief detail some idea of the work that has been done so far in the construction of the Lloyd Barrage and Canals. Much of it is visible to the eye, the great generating station, the railway lines and sidings, the quarry, the giant excavators. Other activities are not so apparent but that they exist and are functioning must be obvious to anyone who realises, however imperfectly, the magnitude of the scheme. What is not so apparent is the constant care and vigilance exercised in the spending of the money allotted to the scheme. At every stage of its progress the financial aspect is carefully considered. The Chief Engineer in charge of the project distributes the work with an eye ever on interest charges, so that money shall not be idle and shall be spent only as and when it is absolutely required. Just as he moves his men and his machinery where they can function most effectively, so his financial resources are used when and where they are required.

Yunnan Tin Trade in 1925

Tin exports in 1925 from China, according to an official statement, were about 7,600 tons, compared with 7,300 tons in 1924 and 8,700 tons in 1923. Most of the 1925 exports were made during the first half of the year, and the balance during November and December. The market for China tin is very irregular indeed, in which respect it differs entirely from the Straits' market. While sales are almost of daily occurrence in the Straits, in China there is no business done for months on end. The reason for this is that holders of Yunnan tin who have bought on a high market, refuse to follow a fall in price in London, "sitting tight" in the hope of a recovery. This is the position at the present time; there have been no sales for export to Europe or America for some months, the only business transacted being trifling lots for China and Japan. Another feature of the market for Chinese tin is the effect which speculation in London and/or New York has on the venue of purchases in Hongkong. It often happens that the business may be confined to one or two firms for a few months and different firms at different periods; it all depends upon the speculating firms at the other end.



The Silverash Immediately after Launching.



The Silverash being Towed into Position after Launching.

Launch of "Silverash." A New U.S. Far Eastern Vessel

GREAT interest attended the launch of the *Silverash*, the first of the order of six vessels placed by the Silver Line, Ltd., of London (Messrs. Stanley and John Thompson, Ltd., managers), from Messrs. Joseph L. Thompson and Sons, Ltd.,'s North Sands Shipbuilding Yard, Sunderland, on June 10.

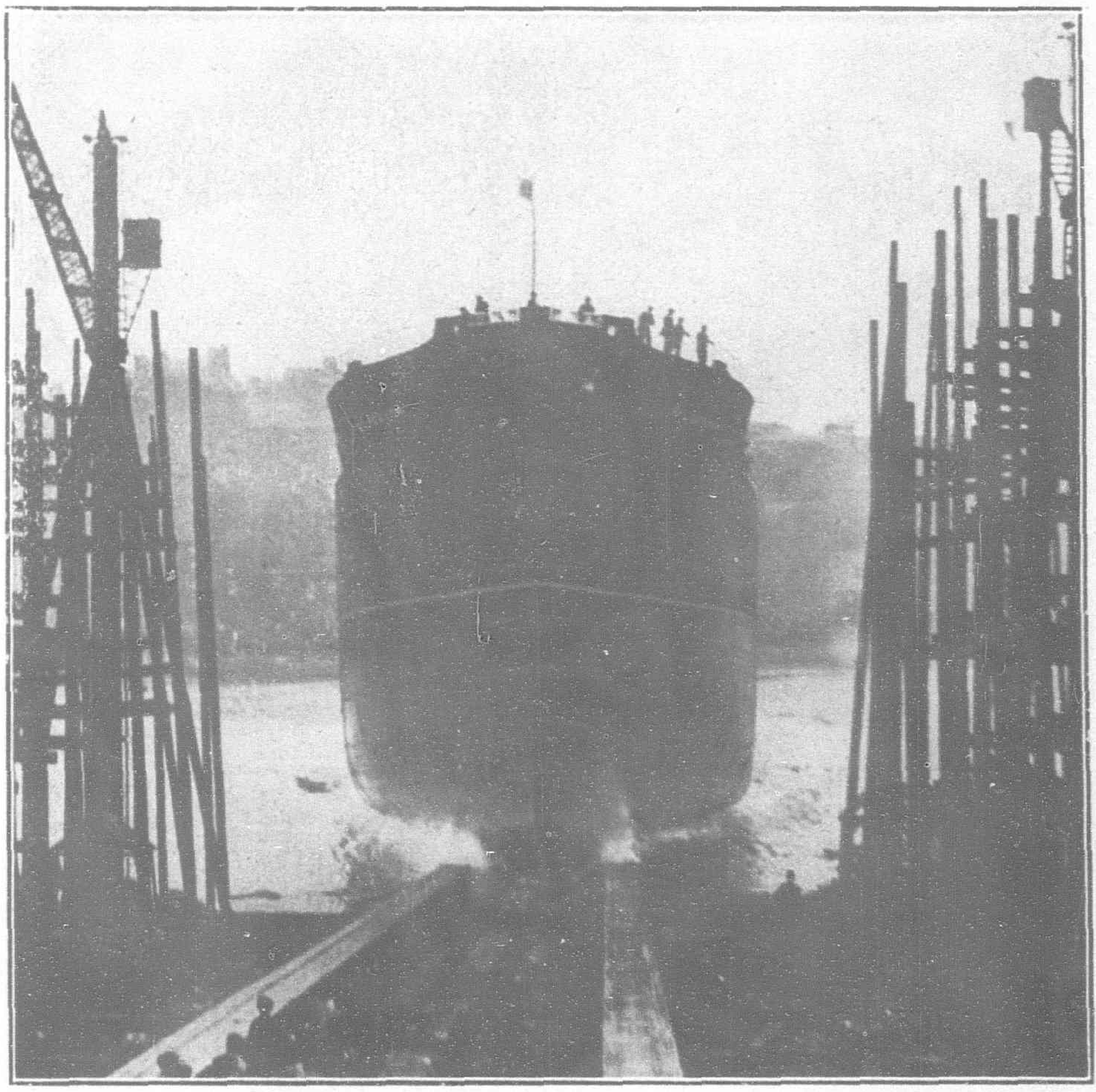
The vessel is intended for special trade between the United States and the Far East, the voyages extending over a passage of about 27,000 miles.

The *Silverash* has been constructed to Lloyd's highest classification, the principal dimensions being: Length overall, about 442-ft., breadth, extreme, 58-ft. 3½-in., and depth to the height of the shelter deck, 38-ft. 6 in.

The vessel is built on the modern shelter deck type principle, having two deep tanks, cellular double bottom for the carriage of water ballast or oil fuel, and two large peaks for water ballast. In every way the vessel is fitted up as an up-to-date modern cargo liner.

Special attention has been given to the arrangements for the rapid handling of cargoes, and 11 winches and 17 derricks will be installed for this purpose.

All the auxiliaries, both in the engine room and on deck, are electrically driven, and the steering gear is of the electro-hydraulic type. The whole of the electrical installation, including the lighting, has been carried out by the Sunderland Forge and Engineering Company, Ltd., who have successfully specialized in this branch of work for a number of years.



The Launching of the Silverash from the North Sands Shipbuilding Yard, Sunderland, of Messrs. Joseph L. Thompson & Sons, Ltd.

The propelling machinery, which has been built and will be installed by Messrs. William Doxford and Sons, Ltd., is of the Doxford airless injection opposed piston type with four cylinders. The bore of each cylinder is 680 mm., and the stroke of each piston is 1,360 mm., the engine developing 5,500 i.h.p., or 5,000 b.h.p. at 90 revolutions per minute. This represents the largest power per cylinder yet put on board of a motor vessel, and is designed to drive the vessel an average speed of about 13 knots in ordinary work on a round voyage.

The vessel and machinery have been built under the personal supervision of Mr. John Catto, of Newcastle-on-Tyne, the owner's superintendent.

The launch was successful in every way, and the christening ceremony was performed by Lady Marr, wife of Sir James Marr, Bart, C.B.E., J.P., chairman of the shipbuilding company and of the Silver Line Ltd.

The *Silverash* is one of the vessels built by the assistance of a large Government grant to aid shipbuilding, and considerable criticism was levelled at the proposition on the ground that the boats were intended to run in the American trade, a circumstance which was said to be akin to providing a bounty for American shipping.

Order for a Sulzer-Engined Motorship

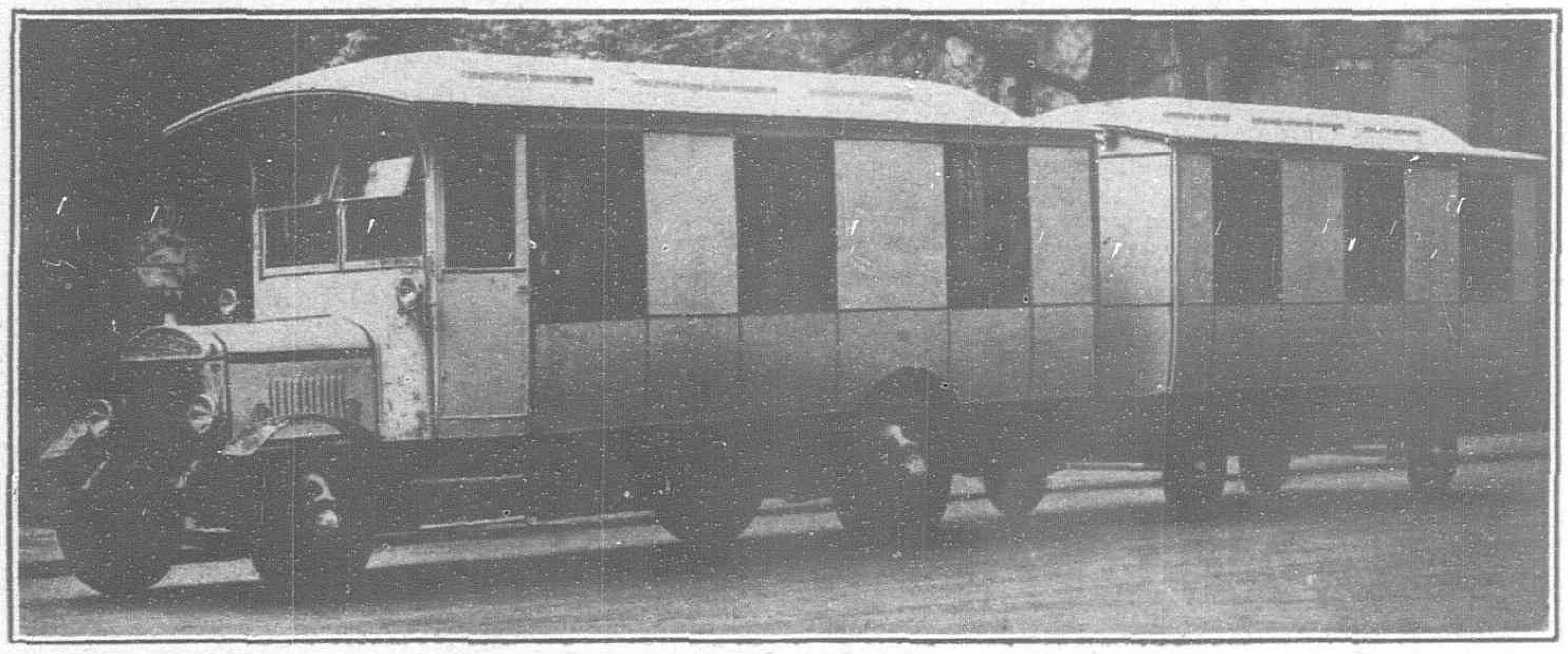
The French shipping company, Messageries Maritimes, whose first motorship, *Théophile Gautier*, will shortly be put into service, has ordered another ship for passenger service to Australia, which will also be equipped with Sulzer Diesel Engines of about 8,000 h.p. The two main engines, 8-ST-60, will be built by our associated company, the CCM Paris, at the St. Denis Works, where the 6-ST-60 engines of the *Théophile Gautier* were also built. We have at present no further details on this important installation.

Luxurious Motor Caravan for Hunting in the Far East

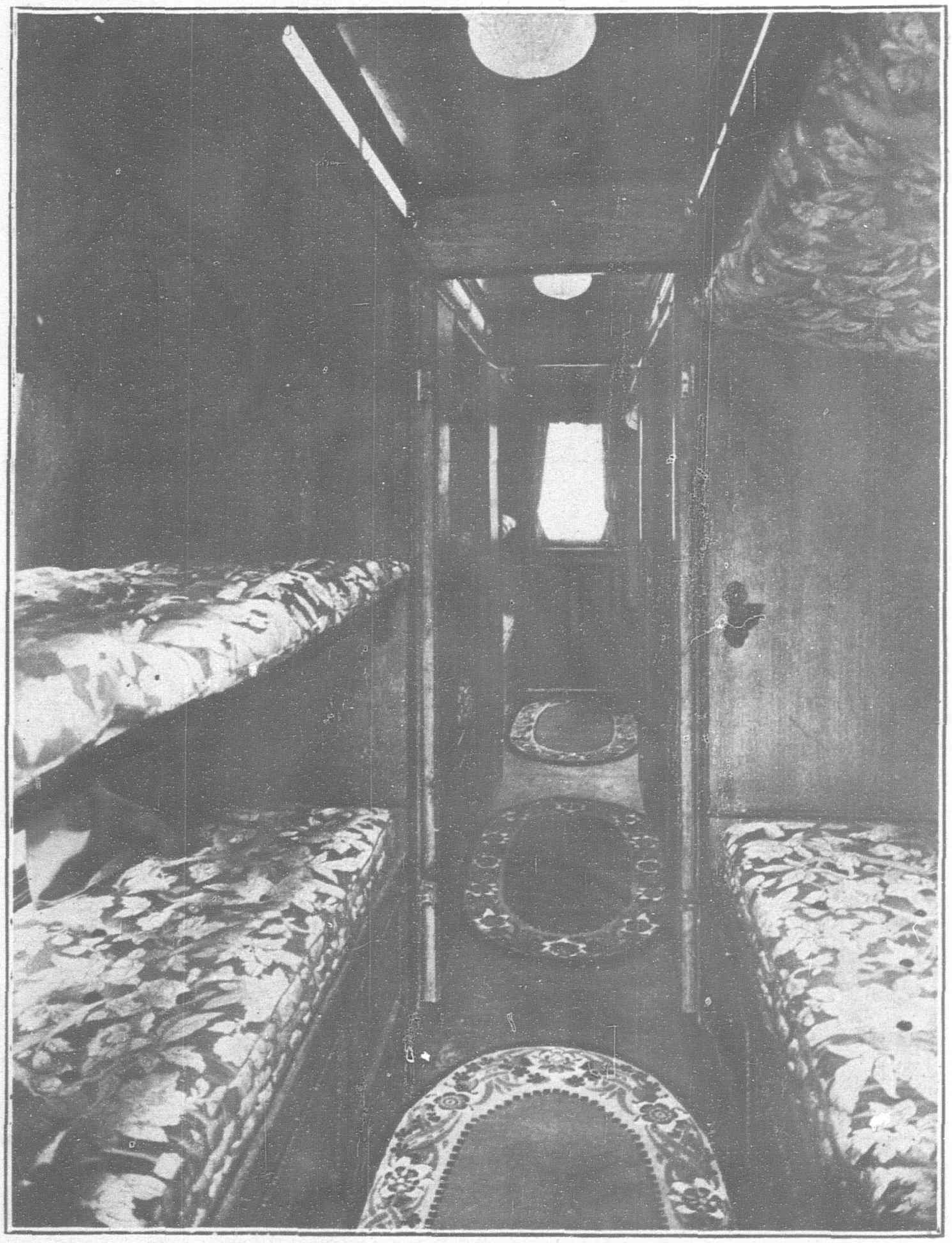
THEIR Majesties King George and Queen Mary gave half an hour at Buckingham Palace recently to the inspection of a motor caravan which has just been completed for the Maharaja of Gwalior. When their Majesties and their suite had completed their inspection the two coaches were driven to the India Office, where the Earl and Countess of Birkenhead inspected them, the Secretary for India giving particular attention to the devices for economizing space. Subsequently a number of the chief officials of the India Office and neighboring Government offices also seized the opportunity of looking over an equipment that promises to add a new note of mobility, comfort, and even luxury to the pleasures of big-game shooting in Eastern jungles.

Although the vehicles are intended for private use, there is scope for the employment of similar machines in a commercial way, such as for the conveyance of tourists. Parties could be accommodated in similar motor caravans and all their needs for long holidays met on board. Undertakings of this kind must, of course, cater for a select few, and the nature of the equipment described hereunder shows what can be done in this direction.

In view of the great expansion of motor coach tours in recent years, it is only going a step farther to provide the same travellers with sleeping and feeding facilities on board, instead of conveying them from one hotel to another. In this way the vehicle owner would keep the business in his own hands and customers would appreciate the reduction in the amount of business formalities, such as paying hotel bills daily.



The New Motor Caravan Recently Constructed by Messrs. John L. Thornycroft & Co., Ltd., for the Far East. Left side view.



Sleeping Compartment in the New Thornycroft Motor Caravan.

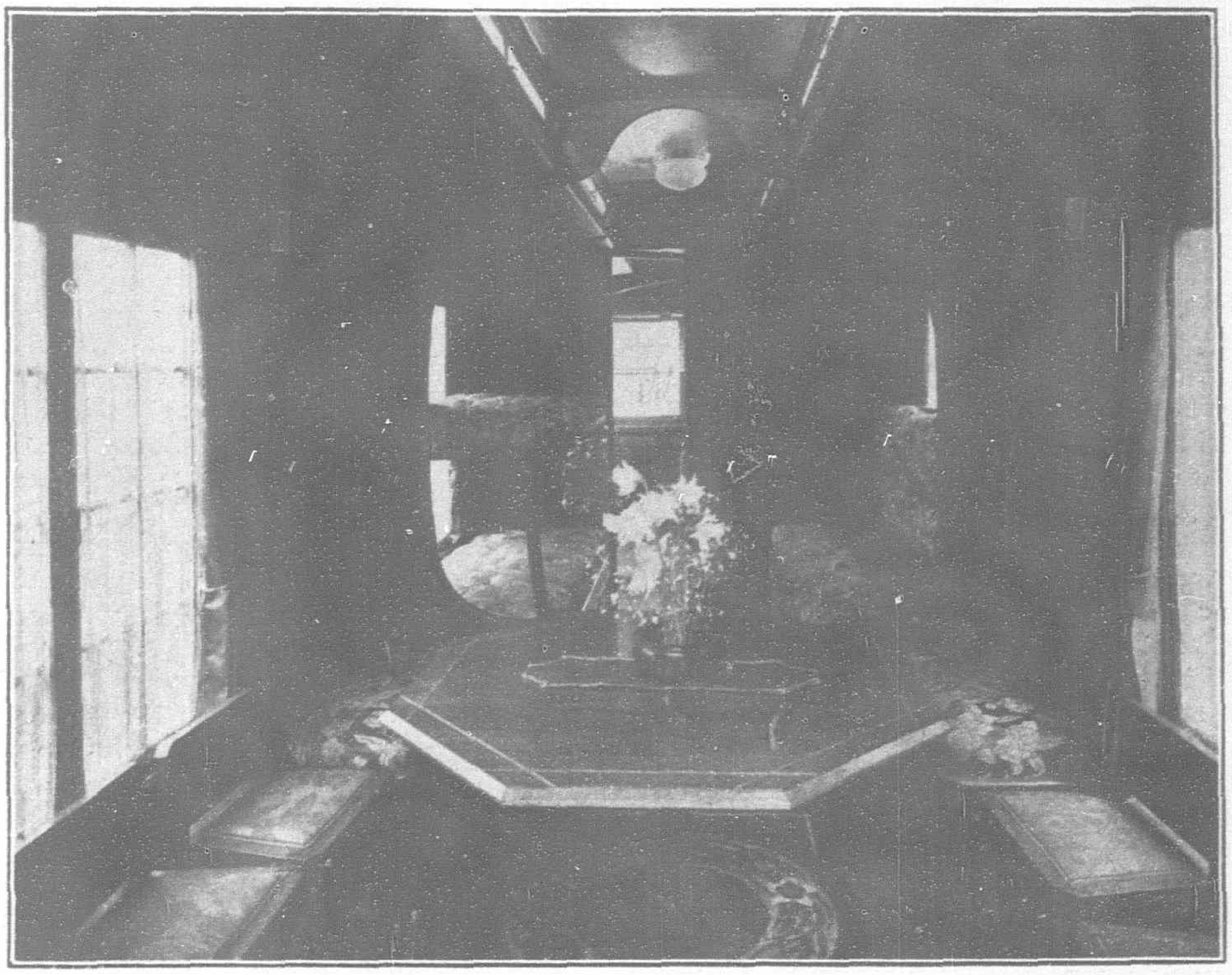
The view is held by some that caravan comfort is necessarily of a limited kind, but the employment of a pair of coupled vehicles gives double the space, and operating costs are not much greater than in the case of the single machine.

The vehicles illustrated comprise a long wheelbase (16-ft. 6-in.) 50 h.p. Thornycroft, model J, and an Eagle trailer. Bodies of the same size, namely 20-ft. by 7-ft. 6-ins., are mounted thereon, both being designed and built by Melville Hart & Co., London. A spring coupling joins the two vehicles and the gangway between them can be converted into a covered passage, thus forming, in effect, one long building on wheels. From front to rear the compartments are in the following order:—driver's cab, lavatory, and dining saloon on the towing vehicle, and three bedrooms on the trailer.

Being intended for work in the tropics, double walls are used, the outer one consisting of compressed wood-fibre and the inner wall being of oak, which is the interior finish throughout. Sufficient headroom is given for a six-foot man, even at the lowest points in the roof arch, which is the clerestory form.

Doors are fitted to the driver's compartment, the rear end of the Thornycroft and both ends of the trailer; the communication doors are of the two-piece type. Windows are metal-framed, and the use of rich blue curtains is reminiscent of a house rather than a caravan. Silk settee upholstery, floor coverings, and rugs all harmonize with the blue, and a gold flower pattern is worked into the cushions.

Electric lighting from the vehicle dynamo is provided for



Dining Compartment in the New Caravan Constructed for the Far East by Messrs. Thornycroft.

the interior, roof and wall lights being effective but not obtrusive. Folding tables are used in the dining-room compartment and capacious food lockers are fixed below the chassis frames of both coaches. A 50-gallon water tank is similarly mounted and space is allowed for camping equipment to house the members of the Maharaja's entourage, the outfit being built to the order of his late Highness the Maharaja Scindia of Gwalior, for hunting and shooting expeditions.

Sixteen persons can sleep on board, four on the Thornycroft and twelve on the trailer. The upper bunks can be folded so as to form backs for the lower ones, thus making seats, or they can be turned over on special fittings and slung up to the roof so as to leave the window spaces absolutely unrestricted. Below the seats are drawers capable of holding large quantities of luggage and corner cupboards in the dining compartment house table equipment.

Below the chassis are carried sets of steps which can be dismounted and fixed to the respective doors when the party decides to camp. Cream is the color chosen for the bodies, the undercarriages being painted chocolate and the roofs white.

Japan's Remarkable Electrical Development

(Continued from page 562).

addition to certain bank and private loans, there have been placed in this market five separate issues of Japan's electric companies, totalling $81,500,000.

Attitude Toward American and British Capital

One of the most oustanding facts in Japan to-day is the attitude of their financiers, business men, and governmental authorities toward American and British capital. No reasonable support is being withheld by them, and the requirements of our own and British bankers and business men are being studied with the idea of meeting all the legitimate requirements of our markets. American, British, and Japanese interests are already working side by side in more than one situation of importance.

Financing of Electrical Industry

It is conservatively estimated that the electrical industry expands in Japan at the rate of from 10 per cent. to 15 per cent. each year, entailing the investment of between $100,000,000 and $150,000,000 of new capital annually. But by far the greater part the development of the electric industry in Japan has been financed by the Japanese themselves, and mainly through issues of common stock.

This has resulted in the establishment of a firm equity, or what is sometimes called a cushion, in the largest and best companies. The laws of Japan require such companies to have at least as much paid-up capital stock as funded debt. The conservative character of this requirement is made evident from the fact that in the United States it is comparatively rare for our own large and eminently sound and stable electric companies to have as much capital stock as funded debt.

The four largest electric enterprises of Japan, the Tokyo, Toho, Daido (Great Consolidated), and Ujigawa companies are already known in the American security market. They rank high in the best informed engineering and investment circles in London, and certain of them are known in governmental quarters in London in connection with financing under the British Trade Facilities Act. But it is not uninteresting or unimportant to know that at home, in Tokyo and Osaka, the big financial centres of Japan, where the intimate details of each company are well known, each of these four companies now known to the American market is regarded as eminently sound and representative of the best type of Japanese enterprise.

Launch of New Dredger—Vizagapatam

On October 7, Messrs. William Simons & Company, Limited, of Renfrew, launched the cutter and drag suction hopper dredger Vizagapatam, which they have constructed to the order of the Government of India for work at Vizagapatam. The dredger has been built under the direction of Sir J. H. Biles & Co., Naval Architects and Engineers to the India Office.

The vessel is fitted with four sets of triple expansion surface condensing engines, arranged to drive pumps or propellers as may be required, and steam is supplied by four cylindrical multitubular boilers, fitted with forced draught installation. The dredging outfit consists of two centrifugal dredging pumps, coupled to a suction frame, designed to a depth of 45 feet under water. The suction frame is fitted with a drag suction nozzle, which can be easily removed and replaced by a spiral rotary cutter, driven through steel gearing from an independent set of compound condensing engines. "Simons" patent suction keelsons are fitted to the hopper, so that the load may be discharged overboard through a floating pipe line, in addition to the usual bottom discharge by means of doors.

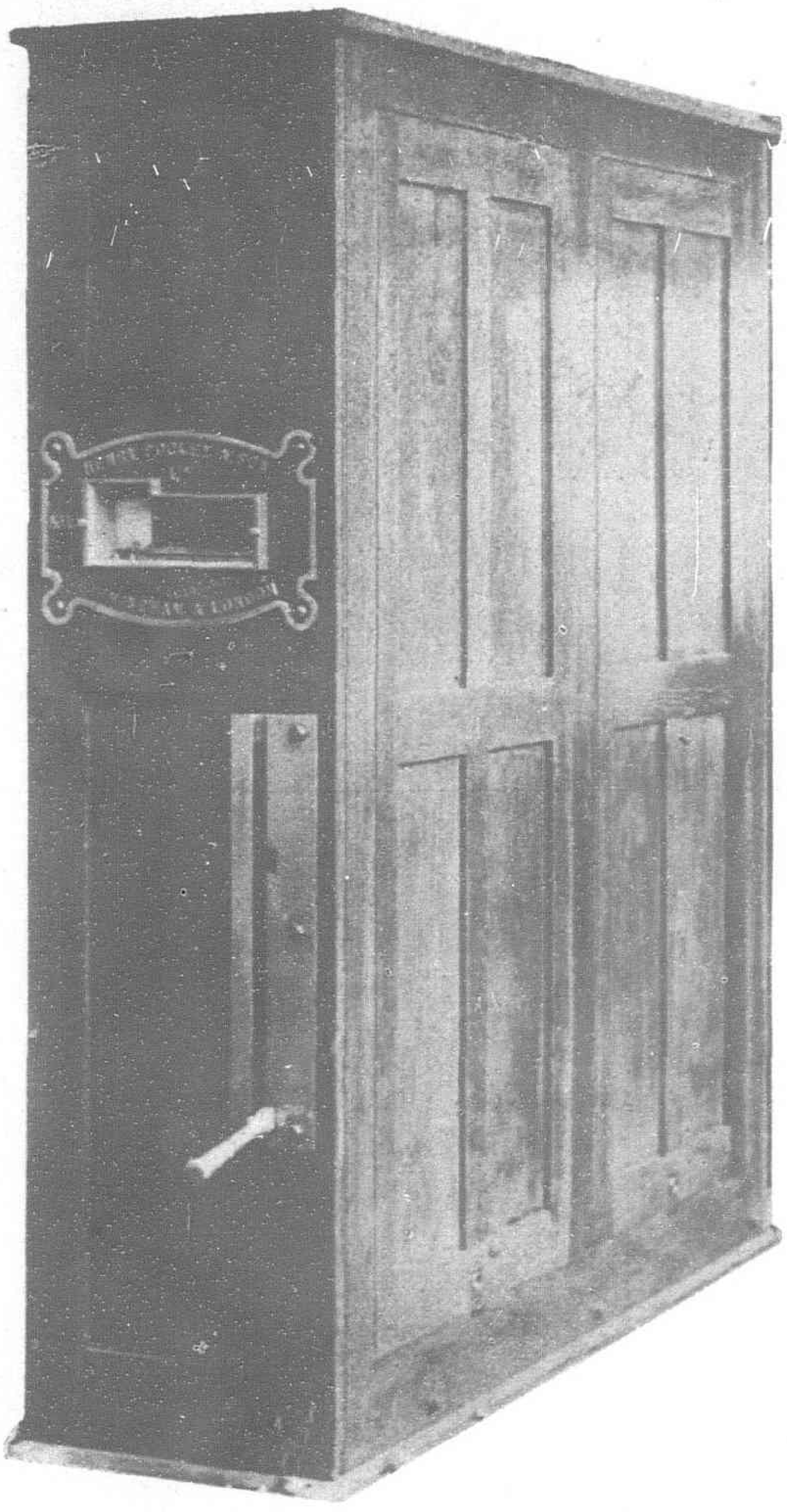
The engine room outfit includes independent condensing plant, automatic feed pumps, bilge pumps, service pumps, filter and evaporator. An outfit of machine tools is provided, capable of dealing with minor repairs. Wire rope tackle blocks and an independent steam winch are provided for controlling the lower end of the suction frame and independent steam mooring winches are fitted at bow and stern.

The christening ceremony was performed by Mrs. Cartwright Reid, wife of Colonel H. Cartwright Reid, C.B., M.Inst, C.E., Engineer in Chief at Vizagapatam.

The Pooley Weighbridges

NINE-TENTHS of the traffic on the Railways of Great Britain is weighed over Pooley Weighing Machines. This is an achievement which speaks for itself and emphasizes the sterling quality of the manufactures of the well-known firm of Henry Pooley and Son Ltd., Birmingham and London.

This firm has a splendid reputation for the accuracy and durability of their Weighing Machines, and their claim that their Machines are the cheapest in the long run on account of their strength and durability is undoubtedly well founded.



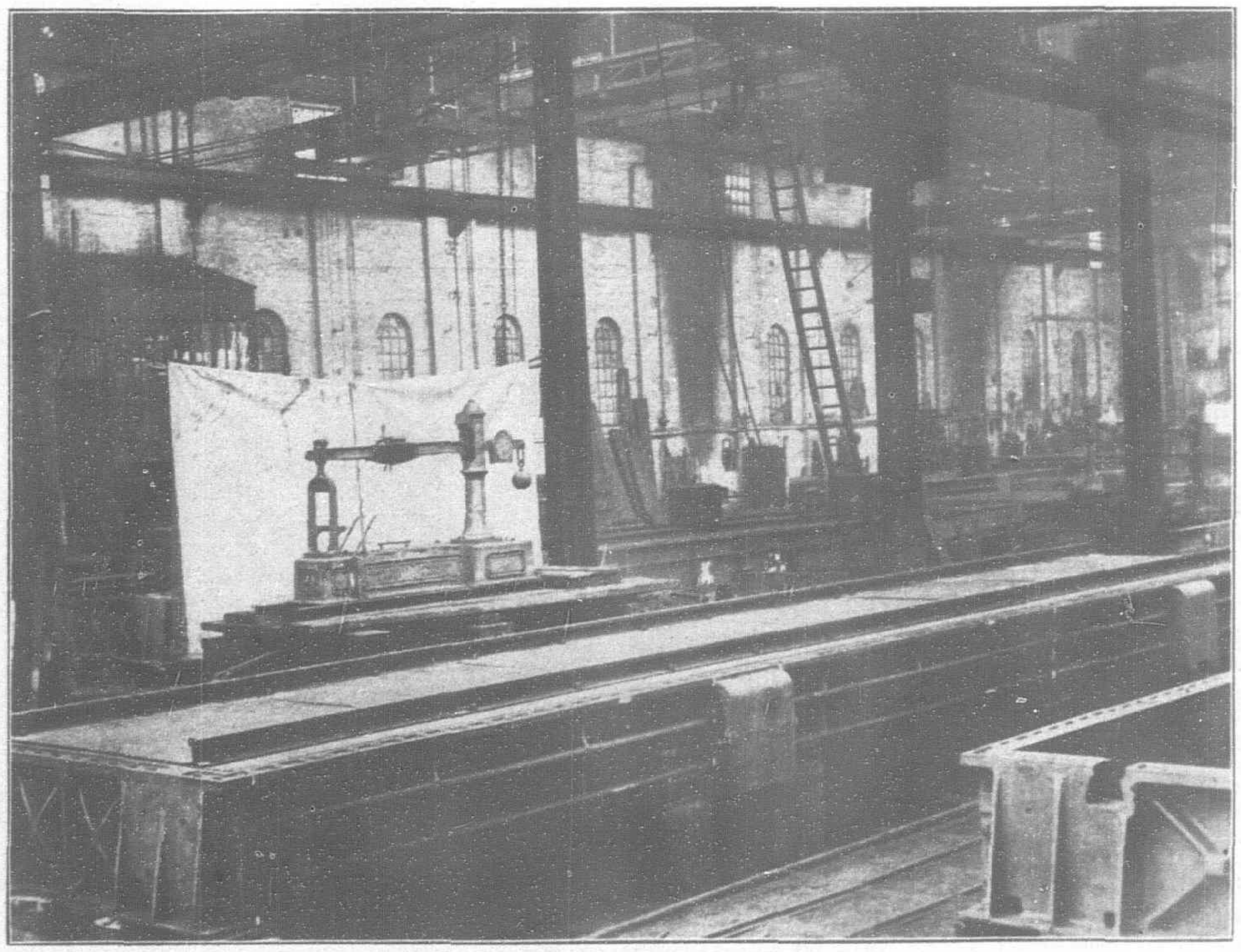
Pooley Quadrant Indicator

In addition to the British Railways, Messrs. Pooley have for very many years past supplied their Machines to all the leading Railways abroad, and this is sure proof of their efficiency and serviceability.

It is interesting to note that the Chinese Railways have also installed a number of the latest and most up-to-date Pooley Weighbridges of the type known as "Combined" Weighbridge.

To-day the majority of wagons in use on the leading Railways of the World and particularly abroad, are of the bogie type, each bogie having four wheels, the wagons being constructed for carrying capacities up to 50 or 60 tons.

As the result of this, when a train is composed of mixed wagons, that is to say, short and long wagons, the necessity for weighing both types without uncoupling becomes of great importance, since it would obviously involve a considerable amount of wasted time if each truck to be weighed had to be uncoupled and then recoupled.



The Railway Weighbridge

Although Messrs. Pooley have previously constructed Weighbridges up to 75-feet long these would not meet the case owing to the mixed nature of the traffic.

The combined type of Weighbridge was consequently introduced, illustration No. 1 shows a weighbridge of this type erected in the Makers' Works before final inspection prior to despatch. The machine was afterwards shipped to China.

These Weighbridges have been constructed with from two to four units coupled to one steelyard or indicating mechanism. The length of each unit is carefully rated, so that wagons have a maximum of run on the machines.

Either one or all of the units may be connected or disconnected at will, and by means of a novel device a loaded short truck resting entirely on one machine can be accurately weighed notwithstanding that at the same time a load is resting on one or all of the other machines.

Messrs. Henry Pooley and Son's connection with Railways extends back to the early days of the Railways, when in June, 1835, they supplied the Liverpool and Manchester Railway with the first Platform Weighing Machine.

This type of machine has since been adopted by almost all the Railways of the world. Previously small packages were weighed either on equal balances or beam scales. This method was very cumbersome and necessarily involved considerable waste of time.

Following speedily in the wake of the Platform Weighing Machine, there came the road and rail Weighbridges fitted with steelyard and loose weights. Developments from this time forward became very rapid owing to the unique position Pooley's were in with regard to Railways to whom they were the only suppliers, as they also held contracts with most of the existing Railways for the upkeep of their weighing apparatus they were able to see at first hand the requirements of the various Departments of Railways, and quickly brought out inventions to meet the various demands, and in 1847 constructed a machine for balancing Locomotive Engines by recording the weight on each wheel. One feature of this machine was the steelyard which was constructed to be used without loose weights, and in the Great Exhibition of 1851 they had the honour of being awarded first prize medal.

Since that time a steelyard without loose weights has been universally adopted. The natural development was now seen to be the automatic indication of loads without any assistance from the weighman.

The first indicator was in the form of a clock faced dial, and this type is still in general use on the Railways to-day.

Messrs. Pooley's, however, have improved on this in the form of their well-known Quadrant Automatic Indicator. This Indicator is far more rapid and very much more simple both in its mechanism and operation, a fact which Railway Engineers abroad have been quick to realise since simplicity is an important point where the machines are likely to be installed where the services of skilled mechanics are not always available.

The Quadrant Indicator is constructed on the lever principle, and operates entirely without the use of racks, pinions, or similar small parts.

In front of the window is a clearly graduated vernier behind which moves a quadrant chart on which are a series of black diagonal lines. The number of tons appear in bold figures on the left hand side of the window and the final weight is read at the point where the diagonal black line intersects the graduated vernier.

With this type of Indicator if is possible to get finer divisions than is the case with the dial type, yet these divisions are much further apart and consequently less liable to misreading. The indication is also very much quicker as the maximum amount of travel of the quadrant is very considerably less than the distance which has to be traversed by the pointer end on a large dial.

Many of the British Railways have installed Weighbridges fitted with this Indicator as also have a number of Railways abroad, particularly in India. It can also be fitted to the ordinary type of Road Wagon Weighbridge and one or two Municipalities in the Straits Settlements have recently installed Pooley Weighbridges fitted with their Automatic Quadrant Indicator.

Weighbridges of modern design are constructed throughout of sufficient strength to withstand the passage of heavy Locomotives without injury to the weighing mechanism.

If a weighbridge has of necessity to be installed on a fast shunting line, it is often fitted with what is known as an extra or relief track, one track being a "live" or weighing track, and the other the "dead" track along which traffic passes which is not required to be weighed. The lever controlling the points is generally placed in the Weigh Office so that the weighman is responsible for all traffic which passes over the live road.

A further speciality of Messrs. Pooley's which has been adopted in the East is their No. P. 1211 Automatic Indicator for Colliery and Mine Weighbridges. It is fitted with an arrangement for taring the weight of the trucks so that when a truck arrives on the machine the nett weight of its contents is instantaneously and automatically exhibited at a small window in front of the indicator. Also by the simple means of pulling a short lever in front of the Indicator an indelible record of that weight is made on a travelling band inside the casing.

The Indicator is fitted with an automatic counter for counting the number of trucks which pass over the machine.

The travelling band containing the records of the nett weights cannot be tampered with as it is inside the look-up casing but it may be removed by an authorised person with no difficulty as and when required.

This Indicator is a great boon to Mine Owners and numbers have been supplied all over the world.

Messrs. Pooley have recently brought out further improvements to this particular Indicator with the result that it can be supplied as a fraud-proof machine.

There has been a long-felt want for an Automatic Mine Weighbridge Indicator which would resist attempts at defrauding. This has particularly been the case abroad where considerable losses have been occasioned in the Mines through duplicating of weighings and tampering generally with the Weighing Machine.

At each end of the Weighbridge, in the centre of the permanent way are fixed two non-returnable spur wheels. These are made to be operated either by a steel bar projecting downwards from the Colliery truck, or by the axle of the truck, and thus ensures that the truck once off cannot be pushed on the weighbridge again.

In addition to this the printing handle on the Indicator is so arranged that it will only print when a load is on the Weighbridge, and further, will only print once for that load. As a result of this it is only possible to weigh a truck once and to make one record of that weighing.

A large Colliery in India has installed a number of these machines and has reported that they are giving excellent satisfaction.

In addition to the one or two special machines mentioned in this article, Messrs. Henry Pooley and Son manufacture very many other kinds, and in fact, are in a position to supply any Weighing Machine requirements, and their unique experience is always at the service of their customers, and they are ever ready and willing to consider any special requirements and to provide for them.

It is an actual fact that there are in use to-day all over the world numbers of their Weighing Machines both large and small which have been installed as far back as 30, 40, and 50 years ago which are still giving good and efficient service.

Old Chinese Silverware Exhibited in London

It is a rather curious fact that Chinese art of the T'ang dynasty, which ended a thousand years ago, speaks in a language more intelligible to the modern European than the art of the dynasty which ended in 1912. This truth, which was brought home to us in a forcible way by Sir Aurel Stein's discoveries in Chinese Turkestan is once again illustrated by a collection of silver objects which have been acquired by the Trustees of the British Museum, and placed on exhibition in the Asiatic Saloon there.

This collection dates from the year 877 A.D., and comprises dishes, bowls, cups, a ewer and a box, in all 15 pieces. They are stated to have been found in a tomb in the Pei Huang Shan, near Sianfu, Shensi. Certain it is that they all came from the same burial place, for the earthy incrustations which disfigured their surface had the same character in each case. These have now been cleaned off, except from one piece which remains as a witness of their original condition; and in the process the full beauty of the silversmith's work has been revealed.

Seven of the objects are plain, but distinguished by a dignity of form which recalls English Tudor plate. These include a wind ewer of interesting shape and with the lid secured to the handle by an ingenious sliding attachment; and a small cup with an engraved inscription which states that it was made for the Great Officer Wang in a year corresponding to 877 of the Christian era, and that its weight was officially attested as two taels and half a candareen.

If in this piece is much documentary interest, the other eight decorated vessels will delight the connoisseur by their engraved, stamped, and repoussé designs and by the beautiful quality of their gilding. The gilding is used in some cases to enhance the principal features of the design, while in others, such as the two vases, the whole ground is covered with a pale gilding and the prominent features are emphasized with thicker gold. One of these, a bottle-shaped vase (a trifle over eight inches high) has a typical T'ang shape which occurs in the Buddhist stone carvings and in the burial pottery of the period. Its body is engraved with a scene representing the story of the sage Chiang Tzu-ya discovered fishing and called away to be advisor to the Emperor, who founded the Chou dynasty. On the shoulder is a band of repoussé birds and sprays rising from a finely pounced ground which has the soft sheen of satin. The other vase, very beautiful with its foliate lip, is engraved with the twelve Zodiac animals between two wreaths of foliage.

The story of Chiang-Tzŭ-ya appears again on an oblong dish, with ogee rim of strangely European form. Here the border ornament is partly in repoussé, and the designs are parcel gilt. There is another dish of similar form, but not gilt. This is richly engraved in the center with an elaborate design of foliage scrolls and parrot-like birds, and underneath are scratched the characters of Wang Ts'ung-yo—evidently the full name of the Great Officer Wang.

There is also a cinquefoil bowl on a high wide foot. This bowl is beautifully decorated inside with repoussé birds and foliage, engraved floral sprays, and a pounced border. It is parcel gilt, and so is an oblong lobed cup, shaped like a plain silver cup in the Shoso-in at Nara, but decorated with engraved and repoussé designs. In either end is a figure subject, one apparently representing the woodcutter Chu Mai-chièn, who became a minister, and the other the same person replying to the taunts of his wife. The remaining pieces are a round box, with repoussé lions and phoenixes on the lid a ground of engraved phoenix tail feathers, and a cup in the shape of a corn measure, with a carefully-worked wicker ground identical with that reproduced in various specimens of Sung pottery.

Placed beside the silver work of the best European period, these vessels would appear neither inferior in workmanship nor conspicuously foreign in taste. The quality of the metal, gilding, tooling, and repoussé ornament, and the elegance of the shapes and designs, prove that the T'ang silversmiths were artists as well as craftsmen of the first order.

Humanitarian Treatment of Labor in Japan

(Continued from Page 560.)

cases which do not necessitate the advice of the President, the Mill Manager may make a decision, on the basis of the report of the Chairman of the Relief Committee, and put it into immediate effect by rendering a report to the Managing Director.

Art. 3.—The Relief Committee shall consist of five members, and there shall be at least one representative each of the Clerks, Machinists, Physicians, and Operatives. The Head or a Branch Mill may, however, vary the number on the Relief Committee according to circumstances.

Art. 4.—The members of the Relief Committee shall elect their Chairman from among themselves.

Art. 5.—The term of office for a Relief Committee member, shall be one year. The election shall take place in December. Committee members are eligible for re-election.

Art. 6.—Vacancies in the Relief Committee shall be filled without delay.

SECTION II.—FINANCIAL AID IN CASE OF ILLNESS AND INJURY OR DEATH, INCURRED DURING THE PERFORMANCE OF DUTY.

Art. 7.—In case an operative in the employ of the Company becomes ill, sustains an injury in the performance of his duties, or dies, the Company shall grant a financial aid, in accordance with the following articles, in addition to the aid provided for in the Regulations of the Kanebo Mutual Benefit Association.

Art. 8.—In case an operative falls ill, or sustains an injury in the performance of his duties, he shall be entitled to medical treatment in the Company's Hospital, or at any hospital, or infirmary, authorized by the Company, at the expense of the Company. The Company shall also furnish the patient, free of charge, with artificial limbs, eyes or fingers, when necessary, after he has undergone medical treatment. If the injured operative has received medical attendance at a hospital, or infirmary, not authorized by the Company, the Company shall pay to the operative all the expenses connected with the treatment.

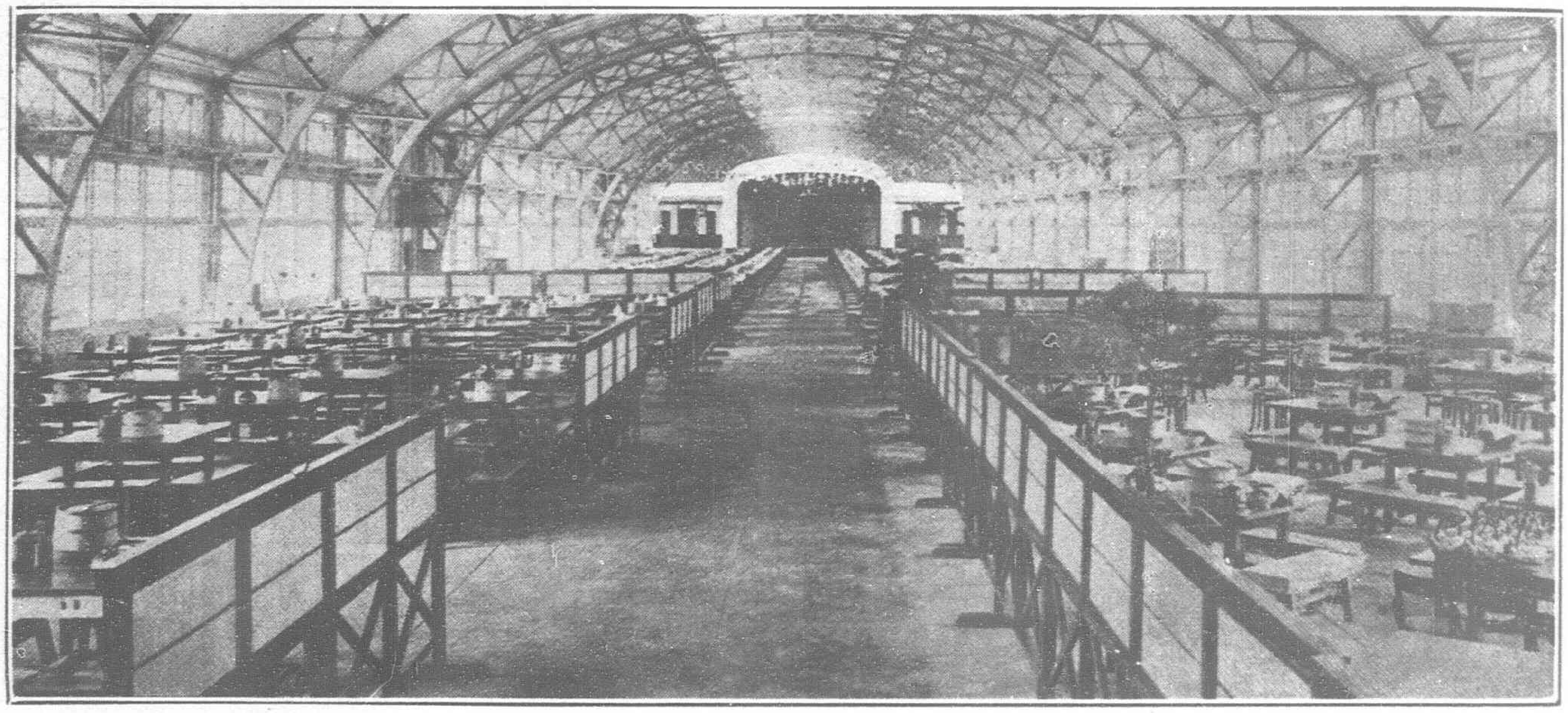
Art. 9.—The Company shall grant a financial aid equivalent to his daily wages, to an operative who, either through illness, or injury, absents himself from work, while he is under medical treatment.

Art. 10.—In case an operative is killed in an accident, or dies while under medical treatment for an injury sustained while at work, the Company shall pay the bereaved family his funeral expenses and give them a regular allowance and a special grant. The following are the minimum allowances, subject to an increase on the basis of length and quality of service, position, age of the deceased, and the circumstances of the bereaved family :

Funeral expenses :	Thirty Yen.
Financial aid to the bereaved family :	A sum equivalent to 170 days' wages.
Special Grant :	A sum equivalent to 530 days' wages.

The amount of the special grant, to be determined by the Committee on Pensions for Employees retiring by reason of illness, old age, etc. should be sufficient to support the bereaved family, until such time as they become self-supporting.

Art. 11.—For an operative who dies of sickness, the Company shall allow the bereaved family, his funeral expenses and a regular and a special grant.



Workers' Dining Hall

The following are the minimum allowances, subject to an increase on the basis of length and quality of service, age, position and family circumstances.

Funeral expenses :	Twenty Yen.
Financial aid to the bereaved family :	A sum equivalent to 170 days' wages.
Special Grant :	A sum equivalent to 430 days' wages.

Art. 12.—The funeral expenses mentioned in the preceding two articles, shall be paid to the member of the family of the deceased, who is in charge of the funeral. In case the deceased is survived by a widow and children who had not been formally registered, the Company shall see that the amount is properly divided between the widow and children, and such other members of the family as are entitled to such benefits by the Ordinances for the Operation of the Factory Acts. If the deceased leaves no widow nor children the whole amount shall be paid to his family. But, whenever it is advisable, the Company may deviate from this general principle, either by making any member of the bereaved family, other than the deceased's widow, the beneficiary of these allowances, or by dividing the money properly between the widow and the other members of the family. The special grant may be paid in instalments monthly or otherwise for a definite period.

Art. 13.—If an operative is found, on recovery from sickness or injury, to be unable to wait on himself, or to be incapacitated from work for life, though he may be able to wait on himself, the Company shall allow the following minimum, subject to an increase on the basis of length and quality of service, age, position and family circumstances. Moreover, the Company shall contribute towards his living, a financial aid during his lifetime.

Allowance : A sum equivalent to 300 days' wages.

Convalescents Taking Fresh Air

Convalescents Enjoying Fresh Air

Art. 14.—In case the operative mentioned in the preceding article, is either a married woman or after her injury contracts a marriage with the approval of the Company and keeps a home, the Company shall either provide her with a house, or pay her a reasonable sum of money for house rent. The Company shall, in addition, give her such an allowance as will enable her to secure the service of an attendant.

Art. 15.—To an operative, who as the result of disease, or injury, is incapacitated from work, or rendered invalid, or to a female operative who is seriously disfigured, the Company shall pay an allowance varying according to the extent and nature of the injury, or physical disability, the following being the minimum allowance, subject to an increase on the basis of length and quality of service, position, age and family circumstances.

Allowance : A sum equivalent to 150 days' wages.

Art. 16.—If an operative is found, on his recovery from sickness or injury, not to be as strong as he was, though he may be strong enough to resume his former work, the Company shall pay an allowance varying according to the nature and extent of the injury and physical disability. The following is the minimum allowance, subject to an increase on the basis of length and quality of service, position, age and family circumstances.

Allowance : A sum equivalent to 30 days' wages.

Art. 17.—In the case of an operative coming under the provisions of the two preceding articles, who does not wish to return to his former employment on his recovery, but desires to retire from the service of the Company, the Company shall pay him an allowance varying according to the nature and extent of the injury or physical disability. The following is the minimum sum, subject to an increase on the basis of length and quality of service, position, age and family circumstances.

Allowance : A sum equivalent to 150 days' wages, which shall not be less than 50 Yen.

(In the case of an operative, who has sustained only a minor injury, the Company may allow him more than that is provided for in Article 16).

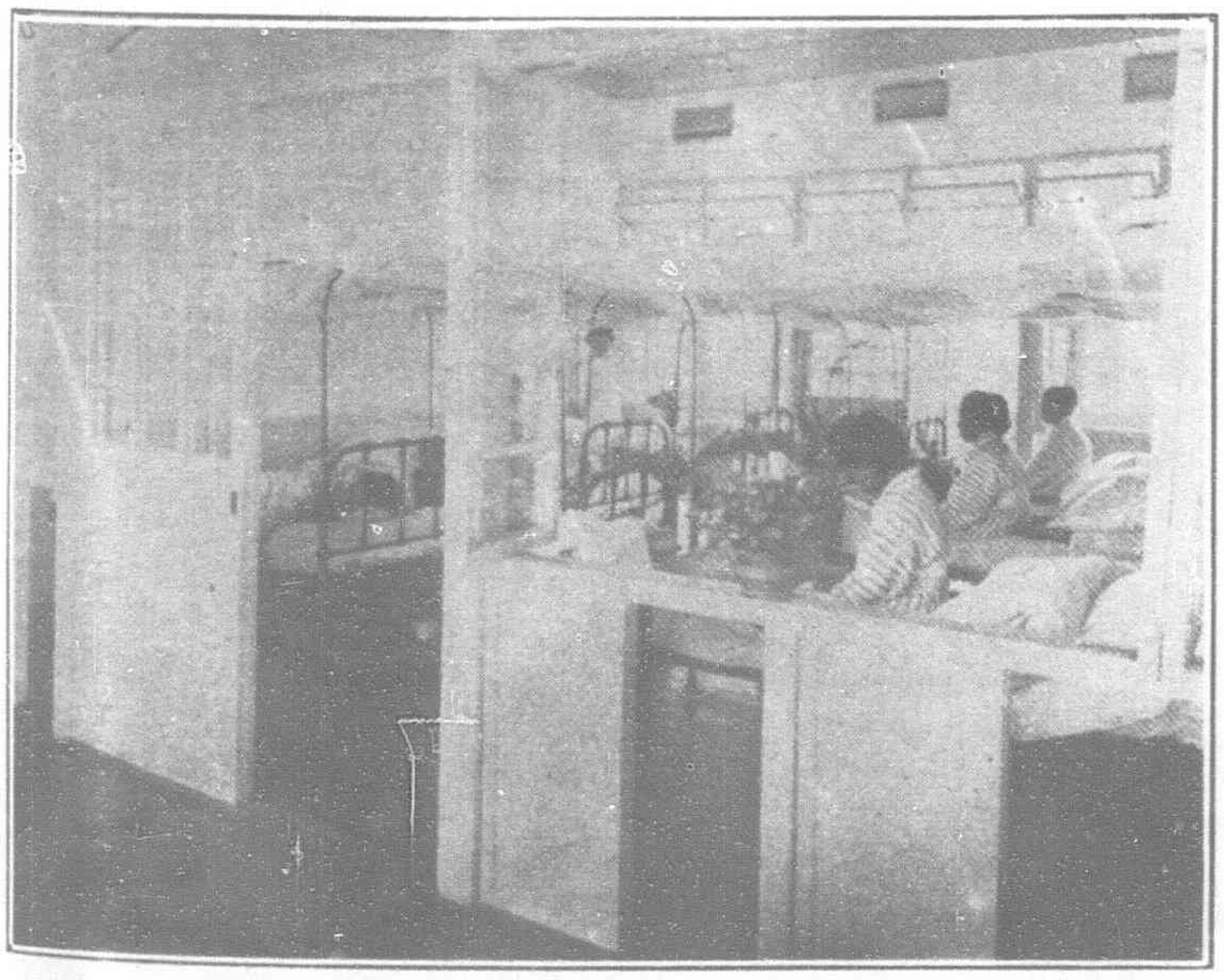
Art. 18.—If the operative mentioned in Article 15 and 16, having continued in the employ of the Company for a certain period, decides to leave it, the Company shall pay him an allowance which is to be determined by taking into account the length of service after recovery, and the difference between the allowances provided for in Articles 16, and 17.

Art. 19.—When a serious accident occurs at the Mill through natural calamity or other causes beyond human control, the Company shall, with the approval of the Board of Directors, render succour to the sufferers, whether killed or injured on a more liberal scale than is stipulated in the preceding articles.

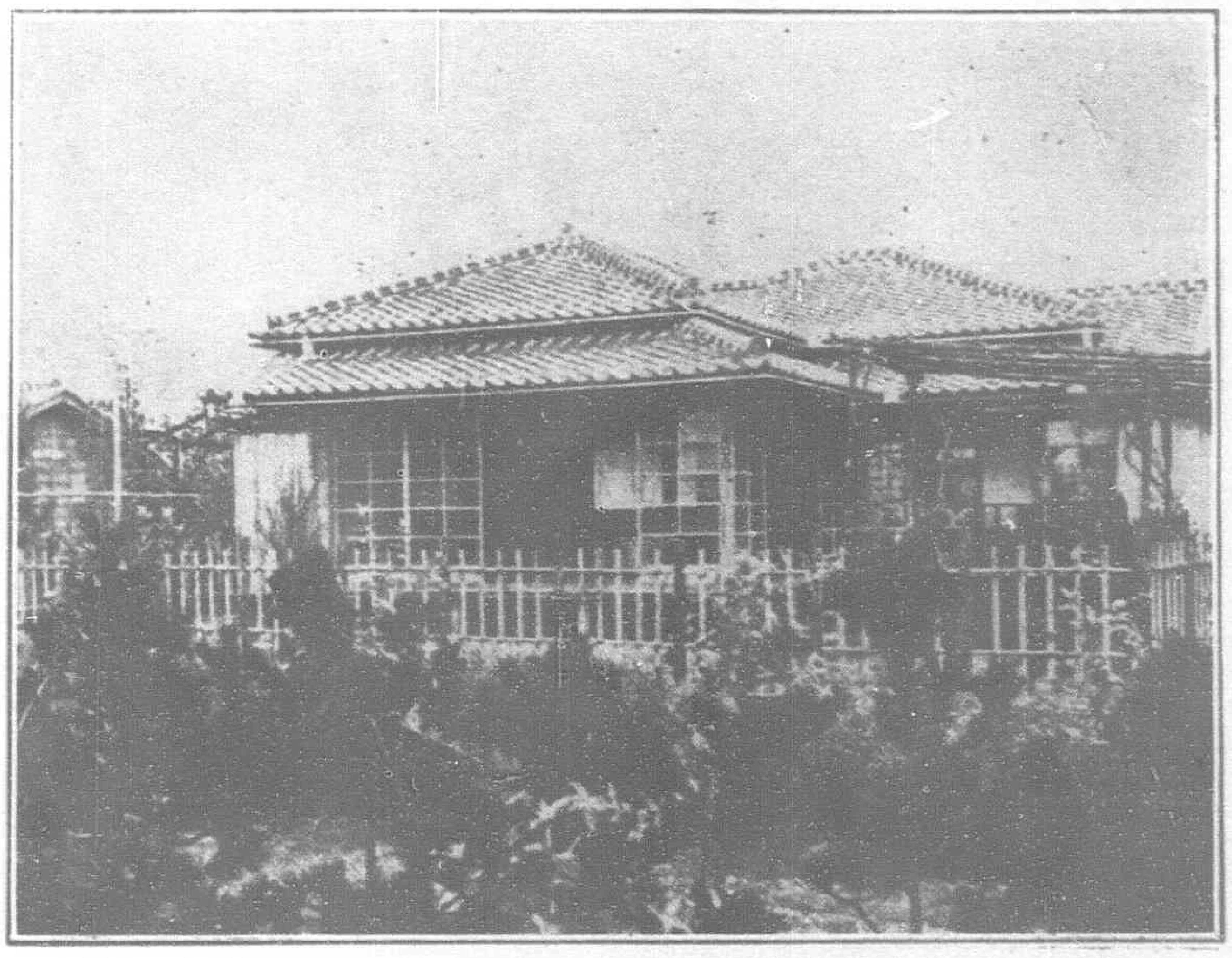
Art. 20.—All cases not specified in the preceding articles, shall be subject to the Ordinances for the Operation of the Factory Acts.

SECTION III.—RELIEF IN CASES OF ILLNESS, INJURY, DESTITUTION OR DEATH.

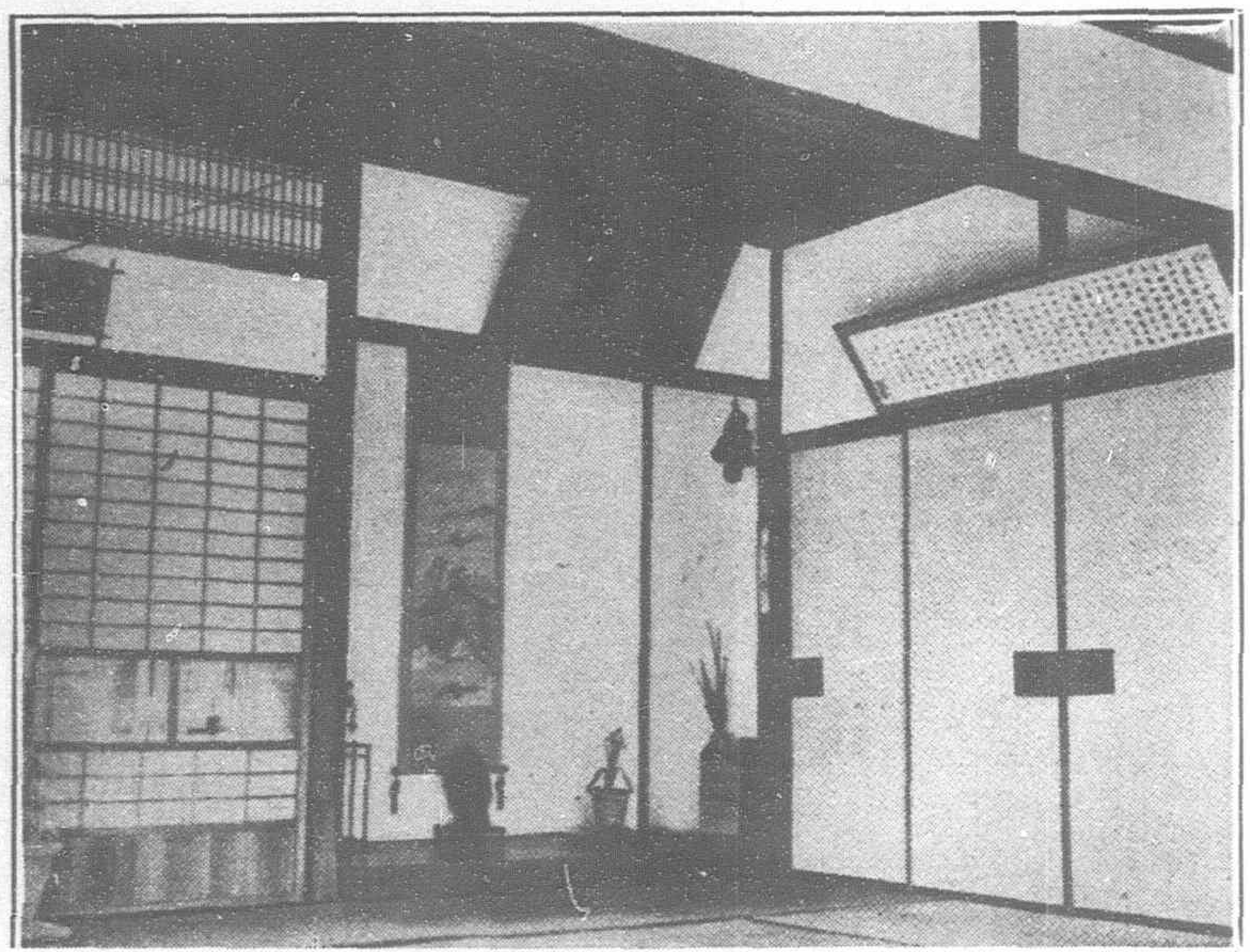
Art. 21.—In case an operative in the employ of the Company falls ill, sustains an injury, or dies under circumstances not specified in the preceding articles, or is in financial distress, through accident



Interior



Detached Cottage for Convalescents



The Interior

or misfortune, the Company shall pay a gratuity, in addition to what is provided in the "Regulations of the Kanebo Mutual Benefit Association," in accordance with the stipulations in the following articles.

Art. 22.—When the physician advises an operative to return home for medical treatment, and recuperation, the Company shall defray all travelling expenses, and the cost of medical attendance. If an operative decides to leave the employ of the Company, he shall be entitled to an allowance varying according to the length and quality of service, position, etc.

Art 23.—In case an operative dies of sickness or injury, the Company shall pay the bereaved family a solatium which varies according to the length and quality of service, position of the deceased, etc.

Art. 24.—If the illness or injury of an operative or his family makes it difficult for him to support the family even with the regular monetary aids from the Kanebo Mutual Benefit Association, the Company may, by taking into consideration of the length and quality of his service, pay him a part of his wages for a definite period of time, or grant him a special allowance.

Supplement to the Regulations for Relief to Operatives

Various provisions bearing on aids to, and relief of, operatives, set forth under Articles 21 to 24, Section 3, of the "Regulations for Relief to Operatives" of the Company, shall be applied, as follows:

Garden for Convalescents

1. When an operative is still in need of medical attendance after the expiration of the aids from the Kanebo Mutual Benefit Association, the Company shall pay for two more months, for medical treatment, a sum equal to what he has been receiving from the Association. In the case of a patient suffering from tuberculosis, this period may be extended to six months.

2. If the grants from the Kanebo Mutual Benefit Association, or the medical expenses provided for in the preceding paragraph, be found inadequate to cover the cost of medical treatment, the Company may give to an operative the necessary assistance, on the recommendation of the Relief Committee.

3.—The extension of the period, during which the patient is entitled to the medical expenses and financial aid, specified in Paragraphs 1 and 2, shall be subject to the approval of the Relief Committee.

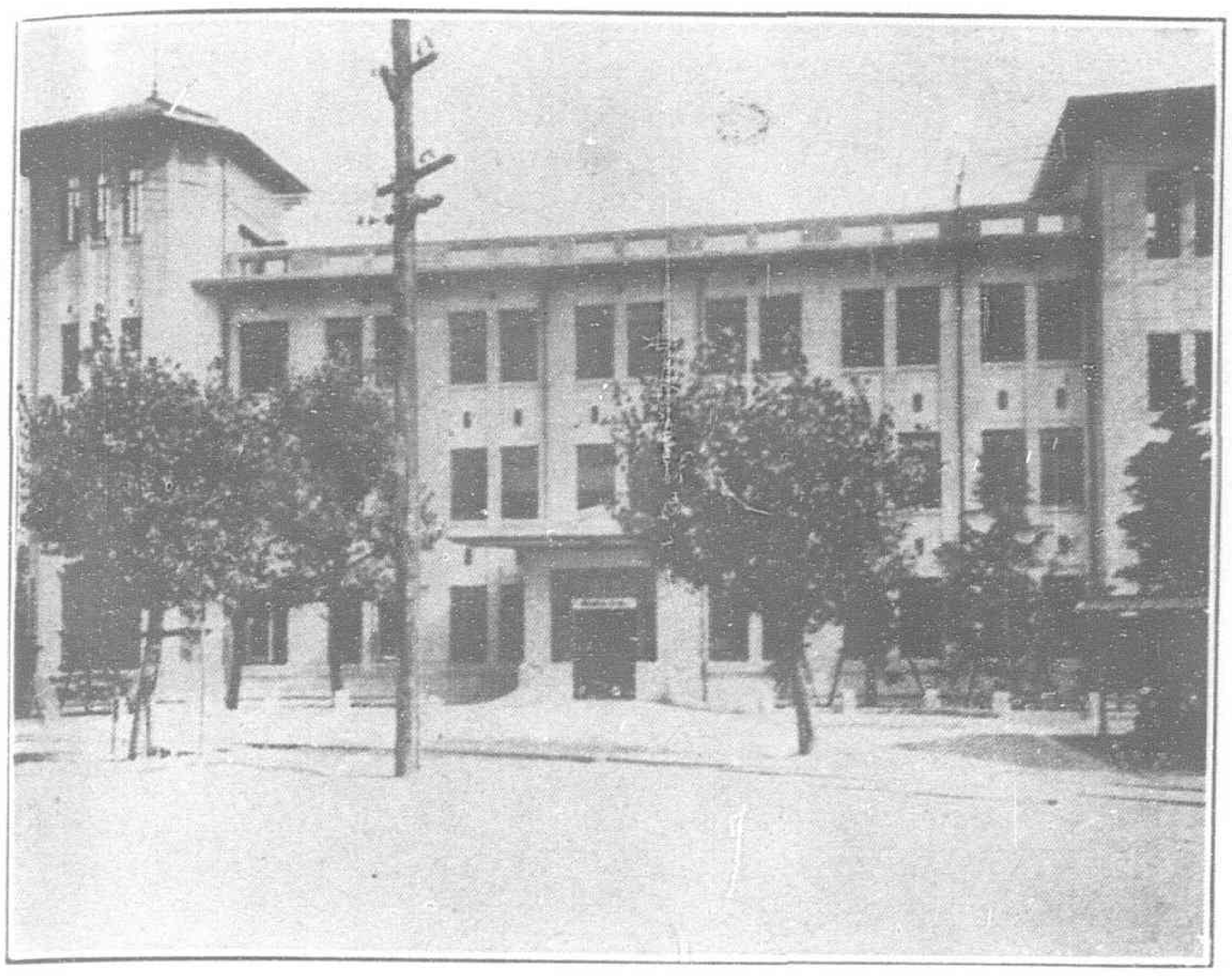
4. In case an operative, living in one of the Company's dormitories, falls ill, he is entitled to free medical treatment, in the Mill Hospital until completely recovered. A patient suffering from diseases of respiratory organs may, at his own request, be sent to a sanatorium, with the approval of the Hospital doctor, and the Company shall defray all travelling and hospital expenses.

5. Such a patient in the Company's Hospital shall receive from the Company, for his personal use, a sum equal to that which he has been receiving from the Kanebo Mutual Benefit Association, as long as he is in the Hospital.

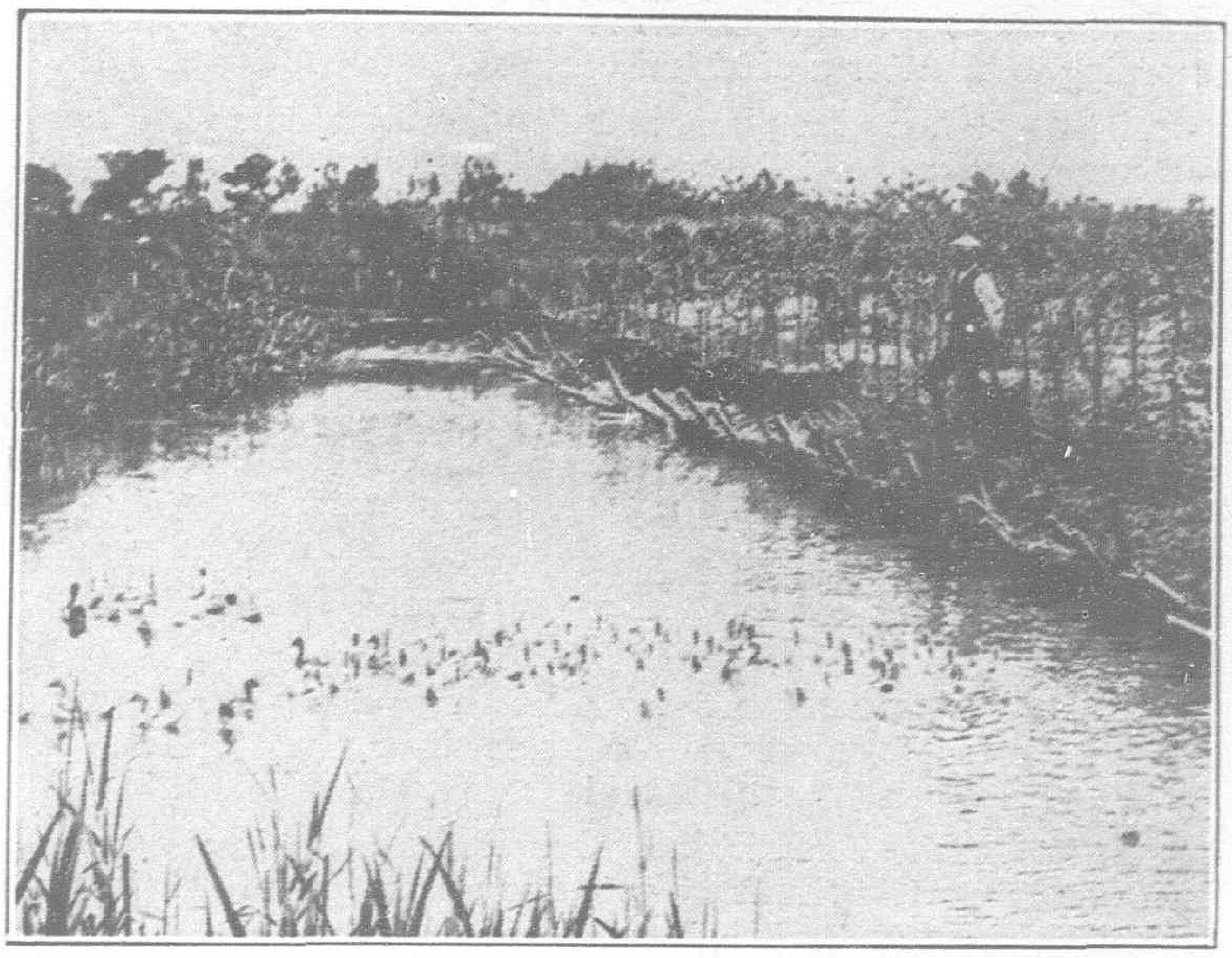
Dairy Farm Owned by the Company

6. If such a patient desires to return home, and the attending physician prescribes such a change, the Company shall send him home, paying all the necessary expenses for travelling and proper medical treatment. The Company shall see that the patient is properly instructed as to how to take care of himself, and that he loses no time in putting himself under the care of a physician of good repute. The amount of the medical allowance, and the duration of its payment, shall be determined in accordance with the provisions specified in Paragraphs 1, 2, and 3. It is desirable that the allowance be paid in several instalments. The Company shall see that the patient gets all remittances without delay, and may make its wishes known to the patient, if necessary, through a village office or a police station.

7. If an operative dies or desires to leave the service of the Company, as a result of sickness or injury, the cause of which can not be traced to the work, the Relief Committee shall decide the amount of solatium to be paid to the family of the deceased; or the amount of allowance for medical expenses, respectively. In the determination of these sums the length and quality of service, the state of health, and the circumstances of the family, shall be



Free Hospital Erected by the Company at Hyogo



Orchards Owned by the Company

taken into consideration. These amounts shall be subject to the approval of the Welfare Office for Employees and Operatives.

As a general principle, the amount of the solatium to be paid to the family of the deceased, shall be a sum larger than what is usually allowed to the retiring operatives.

For an ordinary operative: 20 to 25 days' wages for each year of service.

For a semi-skilled operative: 23 to 29 days' wages for each year of service.

For a skilled operative (section hand): 30 to 35 days' wages for each year of service.

For a 4th grade overseer: For the period preceding his admission to this grade, he shall receive the same allowance as a skilled operative; to this shall be added 20 to 22.5 per cent. of the total amount of the wages he has received, up to the date of his retirement, or death, as an overseer.

For a 3rd grade overseer: For the period preceding his admission to the overseer grade, he is entitled to receive the same allowance as a skilled operative; to this shall be added 22.5 to 25 per cent. of the total amount of the wages he has received, up to the date of retirement, or death, as an overseer.

In case the conditions of health, or the circumstances of the family necessitate still larger financial assistance than is stipulated in the preceding paragraph, the Company may increase the grant within the following limits:

For an ordinary operative:	Up to 40 per cent.
For a semi-skilled operative:	Up to 45 per cent.
For a skilled operative (section hand):	Up to 50 per cent.
For a 3rd or a 4th grade overseer:	Up to 50 per cent.

An ordinary operative, who is in financial distress and whose retiring allowance is inadequate, may be paid such a gratuity as will suffice to meet his needs.

8. If the retiring operative referred to in the preceding articles, is suffering from tuberculosis, the Company shall grant an allowance on a higher scale than that is made in ordinary cases. Accordingly, the Company shall be properly notified when the operative is entitled to this benefit.

9. To an operative who is honorably discharged, or leaves the service of the Company by mutual agreement, the Company shall pay a gratuity, in accordance with the provisions of the preceding articles.

10. All allowances for medical treatment for retiring operatives, paid in accordance with the provisions of Article 7, shall be reported once a month, on the prescribed form, together with the data necessary for the determination of the allowance. The allowances paid according to the special provision in the same Article, shall be reported for approval every time such an allowance is made.

11. If the bonus of a person working outside the Mill is equivalent to his wages for 21 days, he shall be rated as a skilled operative, if less he shall be rated as an ordinary operative.

Regulations for Pensions to Retired Employees on Account of Sickness, Injury, Old Age, Etc

(N.B.—It is to be understood, that in all the following articles, both male and female employees, participate equally, except wherein otherwise specified).

Art. 1.—The Head Office, the Business Headquarters and the Mills belonging to the Company shall each appoint a Pension Committee. This Committee shall be empowered to investigate all matters concerning pensions granted to any person in the employee class who is forced to retire through sickness, injury, old age, etc., and who is placed on the retired list by the Company.

Art. 2.—The head of the various Sections of the Company shall be appointed members of the committee; the Chief of the Secretarial and Shares Department in the Head Office, the Chief of the Secretarial Bureau at the Business Headquarters, and the Mill Managers at the Branches shall act as Chairmen of the Pension Committees.

Art. 3.—Circumstances shall be investigated and pensions given to employees coming under any of the four cases specified below:—

1. Those who tender their resignation through incapacity to work for life on account of wounds suffered or sickness caused by the performance of their duties, or those who are placed on the retired list for the same reasons.
2. Those who tender their resignation through incapacity on account of weak health, or are placed on the retired list for the same reason.
3. Those who are dismissed by the Company, not as a penalty, but for the convenience of the Company; or those who die while they are in the active service of the Company.
4. Those who tender their resignation for reasons not included in the foregoing, but with the sanction and approval of the Company.

Art. 4.—When an employee comes under one of the cases specified above, the Committee shall investigate the conditions under which he is living, and the number of the members of his family dependent on him, and determine, after giving due consideration to the length of his service, the term and amount of the pension, which shall be reported to the President for approval.

Art. 5.—When the President receives the report mentioned in Art. 4, he shall make further investigations, give his decision on the report and carry out his decision with the consent of the Board of Directors.

Art. 6.—The total amount of the pension mentioned in Art. 4, may be given in one sum to a retiring employee if his circumstances warrant such a measure.

Art. 7.—When the sickness, injury or weak health is caused by the unpardonable neglect or intemperate mode of life of the retiring employee, the term and amount of the pension may be cut down according to the nature of his misconduct.

Art. 8.—When a Member of the Pension Committee in a Branch Mill comes under one of the cases specified in Art. 3, the rest of the Members shall consititute the Committee to decide the case. When the Chairman of the Committee or a Member of the Committee at the Business Headquarters comes under one of the cases specified, the President shall decide the amount of the pension.

Art. 9.—When the Head Office, the Business Headquarters, or any Branch Mill desire an employee to resign, a report shall be sent directly to the President, giving the particulars specified in Art. 4, by the Chief of the Secretarial and Shares Department in the Head Office, the Chiefs of the various Sections in the Business Headquarters, and the Mill Managers of the Branch Mills, respectively.

Art. 10.—When a pensioner dies before his term of pension expires, the remainder of the pension shall be given to his widow or children, and when none exist, his parent shall receive the sum.

Art. 11.—The Committee shall make investigations, and shall decide and report to the President at least three months before the expiration of the term, as to the necessity of continuing or altering the amount of a pension.

Art. 12.—When a retired employee, in receipt of a pension from the Company, is employed, without the consent of the Company, by a firm or a company engaged in the same kind of business, his pension shall be discontinued instantly.

Art. 13.—The retired employees receiving pensions from the Company are in duty bound to obey all the orders of the Company, otherwise the pension shall be discontinued.

Art. 14.—In determining the amount of a pension, better terms shall be given to employees working at the machines than to others.

SUPPLEMENT TO THE PENSION RULES.

The benefits of the Pension Rules are limited to those ranked as Employees except that those Operatives who are skillful and excelled in their work, who prove their ability and are acknowledged by the Mill Manager to be worthy of receiving these benefits, may enjoy them when they are reported to the President and receive his sanction.

Moreover, those Operatives who think that they are skillful and excelled in their work, and who think themselves worthy to receive the benefits provided in the Pension Rules, may recommend themselves to the President and if they successfully pass an examination, they may receive the benefits to be derived under the Pension Rules of the Employees.

APPENDIX.—PROVISIONS FOR APPLYING THE PRESENT REGULATIONS TO PERSONS INJURED BEFORE THE REGULATIONS WERE ESTABLISHED.

There might be some unfortunate persons among the Company's former employees and operatives who were obliged to leave the Company on account of the injuries received during the execution of their service, when the above mentioned system of special relief had not been established, and were thus unable to enjoy such a generous relief provided as at present, the Company in August, 1919, advertised in newspapers inviting such unfortunate persons to send notice to the Company. If their claims are found to be well established, the Company grants an appropriate allowance under the present "Regulations for Relief to Operatives" or the "Regulations for Pensions to Retired Employees on account of Sickness, Injury, Old age, etc."

The cases already relieved under these provisions, number 20, including employees and operatives who were granted life pensions.

5. TREATMENT OF EMPLOYEES AND OPERATIVES ABSENT DUE TO SICKNESS.

I. Treatment of employees absent owing to sickness shall be as follows :—

Should an employee absent himself for an extended period owing to illness, the Mill Manager may, in consideration of the length and quality of his service, allow a special vacation within the limits stipulated below (in such a case the period of absence will be considered as though the absentee were in full attendance, and he will receive full wages and also the semi-annual bonuses).

During the period of absence due to sickness for which no special vacation is granted, the wages only shall be paid.

When unusual conditions attach to any individual case, the period of special vacation may be extended on application.

(*a*) To one who has absented himself for a continuous period of less than one year, a period not exceeding one-half of the duration of such an absence may be allowed as a special vacation.

(*b*) One whose absence has extended over a continuous period of one year may apply for a further extension of the period allowed as a special vacation.

II. The cases of non-attendance of Third and Fourth grade employees on account of extended sickness, shall be treated in accordance with the following provisions :—

(*a*) To one who being an employee of above description has absented himself for a continuous period of less than six months, a period not exceeding one-half of the duration of such absence may be allowed as a special vacation.

(*b*) During the period of time in which the absentee is receiving an allowance from the funds of the Kanebo Mutual Benefit Association, the Company shall supplement whatever difference there may be between the amount of the relief allowance and his full wages.

(*c*) After the expiration of the period of time during which the absentee is entitled to receive the relief allowance, the absentee shall notify the Business Headquarters and obtain its decision as to further treatment.

(*d*) As a principle, no vacation shall be allowed during the time of absence due to sickness, no wages paid nor bonuses given, but in consideration of the quality and length of service and the condition of his family, a special vacation not exceeding three months may be granted, wages and bonuses being paid. In such a case, the sanction of the Business Headquarters must be obtained.

In the case of absence of short duration due to sickness i.e. extending over four days but not exceeding two weeks, the same treatment as specified in the preceding two articles may be especially accorded in consideration of the quality of the absentee's service and the condition of his family.

III. Operatives absenting themselves due to sickness shall be treated as follows :—

(*a*) When the Company orders a rest on the recommendation of its doctors, although the patient himself may be ignorant of the real condition of his health, relief money not exceeding one-half of the amount of his wages (average amount of daily wages in the case of those engaged on contract or piece-work) shall be paid from the Asabuki Memorial Fund for Medical Treatment to Operatives, for a period not exceeding three days. (See the "Regulations for Administering the Asabuki Memorial Fund.")

(*b*) In the case of operatives absenting themselves due to sickness, they shall receive not only relief money from the Kanebo Mutual Benefit Association (see the Regulations of the Association) but also receive from the Company, beginning with the fourth day of absence, whatever difference there may be between the amount of the relief money and that of their daily wages. Moreover, the Company shall pay full wages for the first three days of absence.

6. TREATMENT OF MATERNITY CASES.

The Company shall allow pregnant operatives a rest of 75 days in accordance with the "Rules of the Kanebo Mutual Benefit Association," and give additional treatment as follows :—

I. The Hospital of each Mill shall regularly maintain a staff of experienced nurses with midwifery licence in addition to ordinary nurses to attend the patients. These nurses shall attend other patients when there are no maternity cases.

II. The midwives shall give constant and careful attention to patients before and after child-birth, and shall consult with the doctors when necessary for the treatment.

III. All the disinfected materials required in connection with maternity cases shall be supplied by the Company for which the patient shall pay 50 sen (25 cents).

7. WORKING HOURS AFTER RECOVERY FROM SICKNESS.

The employees and operatives of the Company who resume their work on recovery from sickness or injury shall be especially favoured in accordance with the following provisions, in regard to working hours :—

I. The working hours of those employees and operatives who come under the following categories may be especially altered on the recommendations of the doctors :—

(*a*) Those who resume their work after an illness of more than one month.

(*b*) Those who are able to be at the Mill after recovering from the effects of an injury but who feel it difficult to resume their accustomed work.

(*c*) Female operatives who, although able to work after child-birth, have not yet fully recovered their strength.

II. The working hours of operatives may, as far as conditions permit, be especially altered to suit individual cases in one of the following ways :—

(*a*) Night work may be discontinued.

(*b*) He may be permitted to start work later by not exceeding three hours, or leave earlier by not exceeding three hours.

III. This privilege shall be limited to a period of three months, which period, however, may be extended or shortened in accordance with the requirements of the individual case.

IV. Wages shall be calculated as follows :—

(*a*) If the employees and operatives are transferred to work apart from machinery, appropriate wages shall be paid.

(*b*) An operative who starts to work late or leaves early shall be paid by the hour. In the case of those who are engaged on special contract or piece-work, the Mill Manager may, at his discretion, taking a daily average of their earnings for the last month, divide it by the average hours of work per day and pay accordingly. However, the Company may, considering the family circumstances, deem the whole or a part of the unworked hours as having been worked, and pay wages accordingly.

V. In case the Mill Manager deems it necessary, he may apply the provisions of these Regulations to those who work apart from machinery.

8. THE ASABUKI MEMORIAL FUND.

The later Mr. Asabuki served the Kanegafuchi Spinning Co., Ltd., as a distinguished Managing Director from 1892-1907, in the most difficult period of the Company's existence. It was mostly due to his untiring enterprise and strength of character that the business of the Company was carried on successfully through this critical period, and the foundation laid for the present prosperity of the Company. In addition to his various duties, he was much interested in promoting the welfare of the operatives. Many of the welfare enterprises for the benefit of the operatives, which are in operation to-day, were started by him.

At the time of his death, January 20, 1918, the Company thought it most appropriate to found in his memory the Asabuki Memorial Fund to give medical treatment to operatives. This action was ratified at the general meeting of the Shareholders, and an appropriate resolution was passed to set aside Y.100,000 ($50,000) out of the " Profit and Loss Account " for the purpose.

On February 5, 1919, the Regulations for carrying out the purpose of the said Memorial Fund were issued in the name of the present President, to all the Branch Mills of the Company. The Regulations follow :

REGULATIONS FOR ADMINISTERING THE ASABUKI MEMORIAL FUND.

(N.B.—It is to be understood, that in all the following articles, both male and female operatives, participate equally, except wherein otherwise specified.)

The interest on the said fund shall be used in the following ways only :—

Art. 1.—As a Sick Allowance :—to be granted to operatives, in the amount of half of the daily wage, for a maximum of three days from the day he ceases work owing to illness, provided that the rest is ordered by the Company on the Doctor's advice after physical examination.

This grant shall be called " The Asabuki Memorial Sick Allowance."

Art. 2.—As a Special Sick Allowance :—to be granted in an amount not exceeding Y.100 ($50) to operatives suffering from diseases of respiratory organs and desire to retire but who on account of the shortness of their service are not entitled, under Article 7 and 8 of the " Regulations for Relief to Operatives," to receive a sum sufficient for their needs ; or through the financial circumstances of the family find the amount insufficient.

This grant shall be called " The Asabuki Memorial Medical Allowance."

Art. 3.—As Condolence Allowance :—to be granted to an operative's family, in a sum not exceeding Y.100. ($50) when an operative dies, not of injury or illness caused by his official duty, but who, on account of the shortness of his service is not entitled, under Articles 7 and 8 of the " Regulations for Relief to Operatives," to receive a sum sufficient for the needs ; or the financial circumstances of the family make the amount insufficient.

This grant shall be called " The Asabuki Memorial Condolence Allowance."

Art. 4.—For Purchasing Medical Instruments :—to be granted once only, to the Medical Department of each Branch Mill, to purchase one useful medical instrument costing about Y.100 ($50). Such an instrument, when purchased, shall bear words commemorating the late Mr. Asabuki.

Art. 5.—In case the allowances described in Articles 1—3 be granted to operatives, or to their families, the amount shall be in cash put in a paper envelope, on which the nature of the allowance is described. In case the recipient resides at a distance, the allowance shall be sent by Postal Money Order in a smiliar envelope.

Correspondence

The Editor,
" FAR EASTERN REVIEW."
Shanghai, December 3rd, 1926.

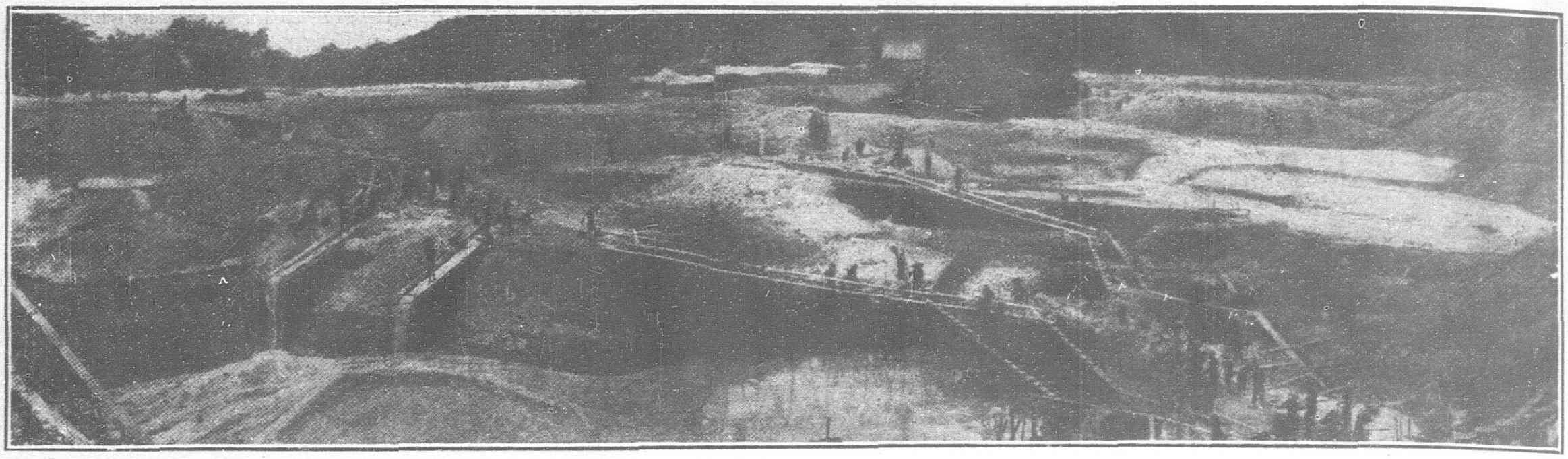
DEAR SIR,

re *Deep Draft Wharves in the Whangpoo* :

In your November issue a criticism is published of Mr. Bryhn's paper on the above matter, suggesting that a certain well-known type of interlocking sheetpiling provides an economical and satisfactory method of overcoming the difficulties of wharf construction in Shanghai. Mr. Bryhn died recently and so is unable to reply to this criticism.

It will however suffice to say that the cross sections shown on page 544 would immediately collapse by undersliding in the Shanghai soil and hence Mr. Timme's deductions as to their advantages are quite misleading. However excellent interlocking sheet piles may be under suitable conditions, they do not, as he supposes, compare favourably with the method advocated by Mr. Bryhn for the local conditions.

Yours faithfully,
HERBERT CHATLEY,
[*D. Sc* (*Engineering*), *London*]



Open Cast Tin Mine at Puket, Siam

Mining in Siam

Valuable Minerals Found in the Kingdom

THE outside world, speaking generally, has little idea of the wealth of Siam in minerals and some notes on the subject should prove interesting. Many minerals are found among which may be mentioned antimony, coal, copper, gold, lead, molybdenum, rubies, sapphires, silver, tin, tungsten and zinc. Of these the only one at present being worked to any extent is tin which is mined in all the Southern or Peninsular Circles and in the Rajburi Circle, and of which indications have been found in other parts.

Practically the entire output of Siamese tin is exported, partly to Penang and partly to Singapore and is shipped mainly in the form of ore, the amount of tin-ore smelted in the country by Chinese smelters being almost negligible. Here we find another instance of Governmental aid to industry. For the purpose of calculating the amount of royalty payable tin-ore is reckoned to contain 70 per cent. of metal, the corresponding figure for the Federated Malay States being 72 per cent. It is estimated that the average metallic content of the concentrates shipped from Siam approximates to the latter figure so that the industry in Siam receives a bonus from the Government equal to the royalty on about 2 per cent. of the output.

Bhuket Circle, which embraces all the Western sea-board of the Malay Peninsula belonging to Siam, is by far the most important mining district and contributes close on 90 per cent. of the total production. In the nature of things tin-yielding districts become less productive and the Changvad comprising the Island of Bhuket, formerly the most important tin-mining center and contributing more than half the output of the whole country, yields less than before, though there are doubtless new areas there capable of being mined at a profit. It seems clear, however, that the time is not far off when the island will be worked out. Prospects on the mainland, however, are constantly improving and appear to indicate a long and prosperous future for Siamese tin mining.

On the East Coast of the Peninsula, Pattani was formerly the largest producer, but during the last few years first place has been taken by Nakon Sri Tammarat Circle.

Though tin has been mined by Chinese miners for years the real history of tin mining in Siam dates back to 1907 when bucket-dredging was first introduced. In November of that year the Tongkah Harbour Tin Dredging Co., an Australian firm, began operations in Bhuket Bay (Tongkah Harbor) with the first dredge to be employed in the Far East in the winning of tin. The Company's operations proved so successful that additions were steadily made to their plant which now comprises five dredges, the two latest machines having a capacity of over 100,000 cubic yards per month.

The success attending the efforts of the Tongkah Harbor Co., naturally induced other companies to take up dredging, but these are all operating inland, extensive prospecting at various points on the coast having failed to reveal a second Tongkah Harbor, though the Tongkah Harbor Co. recently secured mining rights over Chalong Bay, not far from the site of their present operations. In the Changvad of Renong, the Renong Tin Dredging Co. is operating two dredges, the Siamese Tin Syndicate three and the Ratrut Basin Tin Dredging Co. one. In the Province of Takuapa the East Asiatic Co. is operating one dredge on the Pong River, while the Siamese Tin Syndicate Ltd., and Takuapa Ltd., are erecting dredges on land recently acquired in the same neighborhood. Also in the Nakon Changvad the Ronpibon Co., Ltd. are working one dredge and others are being erected.

Not for the first time we are quoting from the Directory for Siam which points out that expansion in the tin-dredging industry in Siam, as elsewhere, was much retarded by conditions arising out of the War, namely, extreme difficulty in obtaining new plant from the manufacturers and the almost prohibitive prices charged for these. The position is now becoming easier and it is probable that more dredges than those enumerated above will be operating in various parts of the Southern Circles before long.

The actual amount of tin obtained by dredging has increased slowly and not very steadily since 1916. It amounts at present to about equal to that obtained by other means, a proportion which, it is to be noted, is not at all fixed but varies with the price of tin. From the table given below it will be seen that the proportion of dredged ore to other ore was about 1 to 2 in 1916, 1917, 1918, the years when the price of tin was abnormally high, and that it was 2 to 1 in 1921 when tin was at its lowest for many years past.

Year	Tin obtained From Dredging Piculs	 Other Sources Piculs
1916	47,298	99,961
1917	51,343	102,439
1918	52,124	96,301
1919	74,993	68,513
1920	59,313	45,170
1921	72,713	30,612
1922	68,618	48,832
1923	61,615	66,467
1924	72,728	60,859

The abnormal demand for Tungsten for use in the manufacture of munitions that was created during the War, and the rise in the market value consequent thereon, stimulated the mining of Wolfram and Scheelite throughout the world. Considerable quantities of both these ores are found in Southern Siam and between the years 1917 and 1920 about 9,000 piculs were mined and exported. In the latter year the demand for Tungsten ceased almost entirely and, the price falling to an even lower level than that which obtained before the War, the industry declined rapidly and is now almost dead.

Gold is won on a small scale in many parts of the country, by Siamese and Chinese, washing in the beds of rivers and streams. In the past European companies, with large capital, have attempted to work some of the deposits, notably at Tomoh, Bangtaphane Wattana and Krabin. In every instance this has been a failure, though how far this was due to the poverty of the deposits and how far to mismanagement it is difficult to determine, but undoubtedly in may cases mismanagement played an important part. On a smaller scale capital has been spent in opening mines at Lomsak in Petchboon and at Pu Kiriu in Lopburi with equally unsatisfactory results. In all of the above-mentioned places small amounts of gold are still won by the local inhabitants, but these operations can hardly be said to constitute a regular industry, as most of those engaged in gold washing regard it as an occupation for their spare time only. At Tomoh, where the alluvial deposits are nearly worked out, a certain amount of lode mining is carried on by Chinese.

An unsuccessful attempt was made some years ago by Danish capitalists to work a copper mine at Chantuk on the way to Korat, and samples of copper ores are occasionally brought in from different parts of the country for identification. Most of these samples are sulphides, but one specimen of native copper has been identified.

With the cession of the Pailin district in Battambong to the French in 1907 the Gem mining industry in Siam ceased to have any importance, but a certain amount is still carried on in the districts of Korat and Chantaboon adjoining Pailin, and the Customs returns show exports of Rubies and Sapphires in the rough which probably have their origin in these districts. The occurrence of a sapphire-bearing formation in the Province of Kanburi was reported in 1921. A Royal Decree was promulgated about the same time, bringing gem mining within the purview of the Siam Mining Act, 1919. Special regulations were drawn up, several applications were received for the right to mine gems in the new locality, and one permit was granted, though the resulting work has so far been chiefly of an experimental nature.

Lead is found associated with tin in some parts of Jalar in Pattani Circle, the lead occurring as carbonate and the tin as oxide. Owing to their having the same specific gravity, these ores cannot be separated by the ordinary methods of water-concentration. They are therefore smelted locally, when a variety of pewter results, which is classified in five grades according to its composition. Grade 1 is nearly pure tin with lead as an impurity ; grade 5 is nearly pure lead with tin as an impurity. This metal appears to be shipped mainly to China. Lead in the form of galena occurs at Karnburi, and probably in several other parts of the country, but up to the present has not been worked on a commercial scale. Unless the economic conditions are very favorable, or the silver content high, it is somewhat doubtful if lead mining will ever prove a profitable venture in Siam.

For many years past Coal has been known to exist in the Gherbi Province of Bhuket Circle and a certain amount of capital has been expended in examining deposits there. Tests made of the coal so far obtained from this source appear, however, to have been somewhat discouraging and further exploitation has been abandoned. The occurrence of coal in the Provinces of Trang and Surashtra is reported and a company has been formed to work these deposits. The coal is lignite and the results obtained from the use of this coal by the Siam Cement Company in Bangkok are reported to be satisfactory.

Leases have recently been issued for the working of Molybdenum in the Province of Chantaboon but, as in the case of Wolfram, the special demand for this mineral came to an end after the close of the War, with the result that stocks were soon accumulated capable of supplying the world's nomral demand for the following two years and the price dropped to a figure which would be unlikely in most cases to cover the cost of production.

Iron is widely distributed throughout Siam in the form of Haematite and Ilmenite with some Magnetite. No attempt has so far been made to mine iron on a commercial scale, but the metal is produced for local consumption in various districts.

The greater part of the revenue derived from mining is obtained from the royalty collected on tin and tin-ore, the balance consisting of payments made on account of rents, fees for Prospecting Licences, etc. The tin royalty is based on a sliding scale and is calculated on the current price of the metal on the Singapore market. The following table shows the revenue derived from mining during the last eight years, and the average price of tin in Straits currency on the Singapore market for the years in question :—

Year	Average price of tin in $ per picul $	Revenue Ticals
2459	89.00	2,776,670
2460	122.00	4,944,464
2461	147.84	7,350,884
2462	148.30	4,648,460
2463	130.00	2,323,599
2464	81.60	1,047,160
2465	86.60	1,340,531
2466	109.87	2,057,596

For the benefit of readers abroad it may be stated that B.E. 2459 is 1916.

The very marked drop in the revenue for the year 2462, as compared with the figure for the preceding year, appears on the face of it somewhat extraordinary, since the total production for the year 2462 was only some 5,000 piculs less than that for the year 2461 and the average price of the metal was slightly higher. The explanation lies in the big increase in the exchange value of the tical, which rose during the year in question approximately from Tcs. 100 equal $63 to Tcs. 100 equal $89. For the purpose of collecting royalty the price of tin on the Singapore market is converted into its equivalent in Tical currency at the rate of exchange ruling at the time and the royalty is calculated on this price. It is obvious that the price in Ticals will vary inversely with the rate of exchange and that any variation in this rate will have a two-fold effect on the revenue, since the resulting value in the Tical value of the metal and in the rate of royalty will both be in the same direction.

In the year 1925 the area of land alienated for prospecting and mining was approximately 261,433 rai or 104,573 acres.

Bethlehem Stainless Steel and Stainless Iron

BETHLEHEM Stainless Steel and Bethlehem Stainless Iron are special alloys which are so called because of their ability to withstand the action of common corrosive agents without the development of corrosion or a permanent stain. This outstanding characteristic is due to the particular chromium content of these metals.

The many possible uses of non-rusting ferrous metals can readily be understood, as well as their general advantages. What is not so well appreciated is their economic value because of the saving in metal that is effected by their use. The total yearly loss of metal due to corrosion and rusting is very large, being estimated at more than 25 per cent. of the new metal produced in the world each year, and the increased use of Stainless Steel and Stainless Iron would very materially reduce this tremendous deterioration and loss.

Bethlehem Stainless Steel and Iron can be rolled, forged, pressed and hammered.

The use of these metals for machinery parts, especially those subjected to strong corrosive agents, combines efficiency with economy due to the great resistance to corrosion.

The polished surface of Stainless Steel or Stainless Iron will remain bright and free from tarnish and will resist the action of salt water. These metals will last hundreds of years. The surface, under certain conditions, may change color with time but will not suffer from progressive corrosion.

Stainless Steel and Stainless Iron have a tendency to withstand high temperatures while exposed to air or other gases, without scaling or pitting. The presence of chromium also gives the property of hardness to iron and steel, thus making them suitable for a wide variety of uses.

Comparison with Other Metals

The physical properties of Bethlehem Stainless Steel and Iron are better than those of the nonferrous metals and better

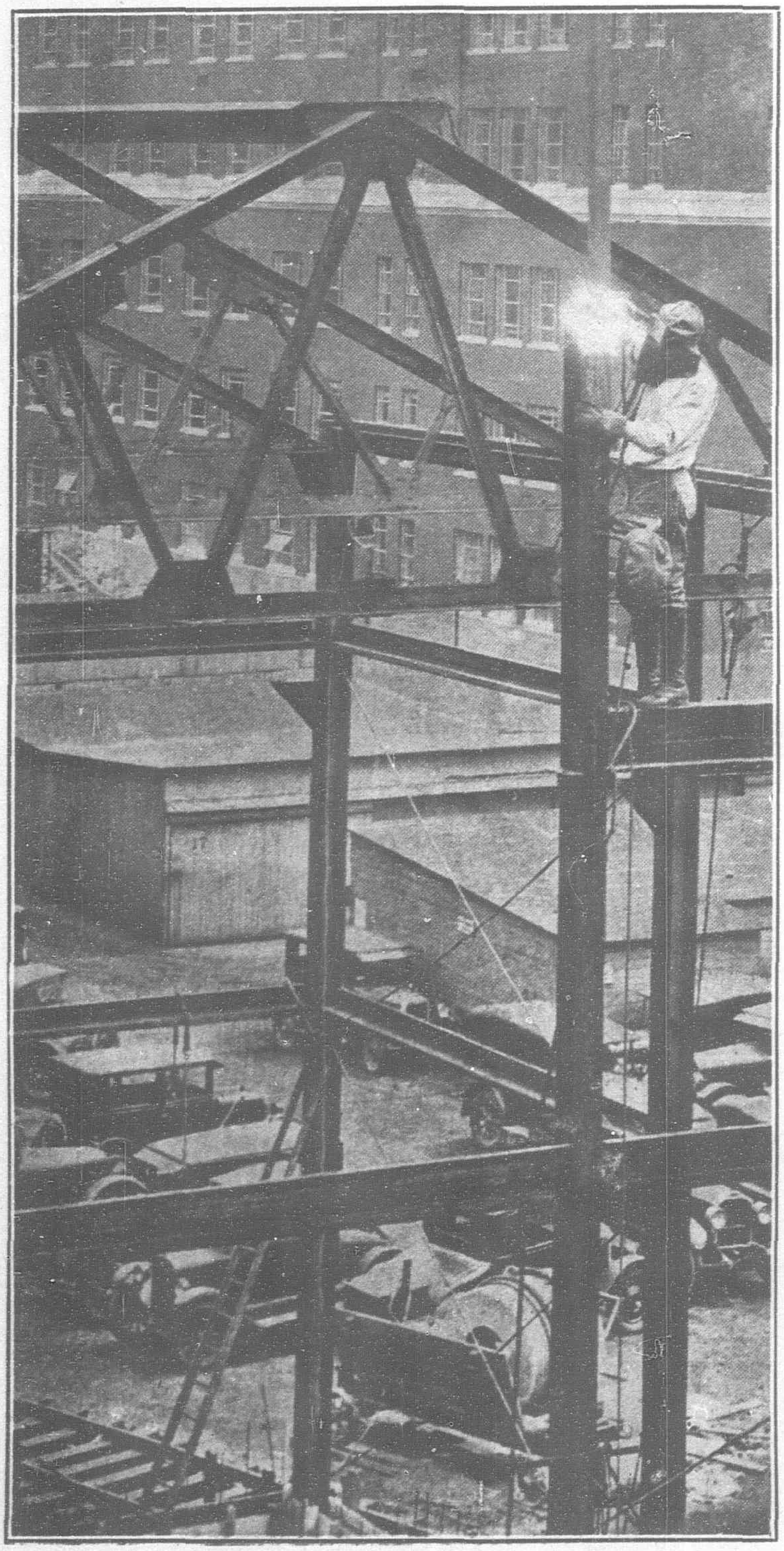
(Continued on page 587).

Arc Welding Successfully Applied to Building Operations

By A. M. Candy

Tests were conducted recently to determine :

1. The proper construction and design of steel members joined by arc welds.
2. The strength of arc welded joints under given conditions.



An arc welder of the Westinghouse Electric Company at work on a one-story steel structure at the East Pittsburgh Works of the Company. All columns and cross members of the building are being welded in place, although the roof trusses, salvaged from another building show rivets. This building is the forerunner of a five-story steel structure to be erected in the Sharon plant of the company, to be entirely rivetless. The arc-welder is seen to be an even more picturesque figure than the rivetter he has supplanted.

3. The savings in steel that can be effected through the lighter construction that is possible when arc welded joints are used.
4. The load bearing capacity of comparably built up welded and riveted steel assemblies.

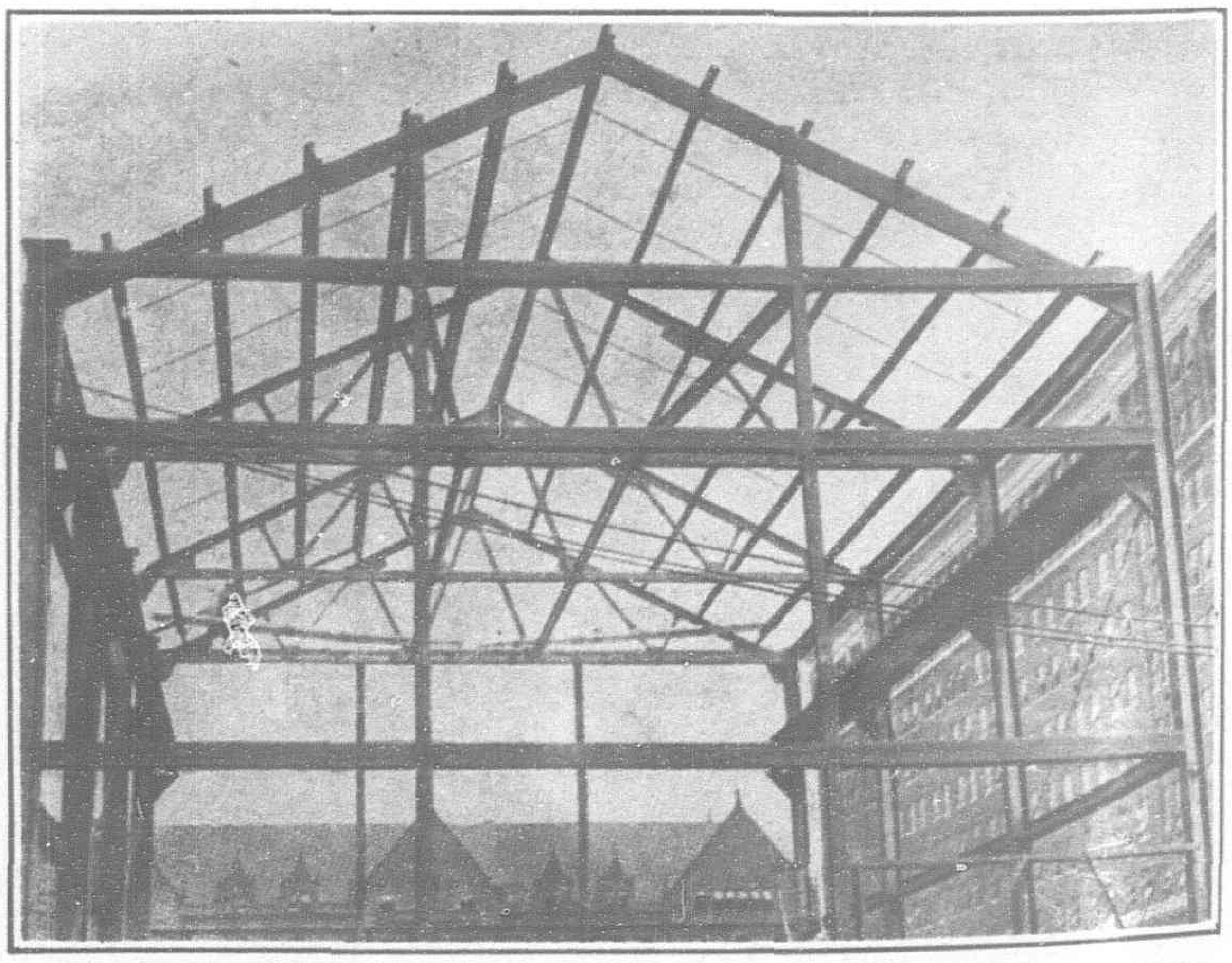
Conclusive results were obtained on all these points. It was amply demonstrated that built up girders, especially designed to efficiently make use of the arc welding process in joining, have greater strength than either similar riveted girders or welded girders composed of members designed for riveting. Conclusions gathered from the tests indicate that entirely new methods of designing will be possible with arc welding, and that resulting economies in both material and technical work in laying out steel for fabrication and assembly will be productive of great savings.

Among the most interesting tests pointing to such conclusions were bending tests of three specimens, fabricated as girders of comparable materials. The table below shows the results and gives the data concerning dimensions and weight :

	Length	Wt.	Yield at	Ultimate Stress At Failure
Riveted Girder ..	15-ft.	798-lb.	55,000-lb.	68,900-lb.
Welded Girder of Riveted Design ..	15-ft.	785-lb.	65,000-lb.	77,200-lb.
Welded Girder of Welded Design ..	15-ft.	795-lb.	65,000-lb.	110,350-lb.

Not only did the girder especially designed for welding show this enormous increase in resistance to ultimate stress, but after failure and removal of the center loading the girder sprang back towards its original shape a maximum distance of three-quarters of an inch.

Although this test is only one of the many conducted it is indicative of the results reached on all the comparisons. On one tension test a riveted member failed at 72,000 pounds because of the pulling out of rivets through the material around some of the holes. A comparable welded specimen failed at 94,000 pounds because of the shearing of the bar beyond the weld. The yield point was 60,000 pounds for the riveted specimen, and 70,000 pounds for the welded one.



This Arc Welded Steel Structure, at the East Pittsburgh Works of the Westinghouse Company, has been Built by Westinghouse Welders

Other types of assemblies produced similar results, cantilevered direct beam and column assemblies all requiring ultimate stresses far in excess of the elastic limits of the steel members. The results so far obtained are conclusive on the following points :

1. Welded construction will respond to principles of design hitherto unused in steel fabrication.
2. The ultimate strength of structural members connected by welding can be utilized.
3. Absolute fixation of beams and girders to columns is possible.
4. Continuity of loading of structural members past either girder or column supports can now be secured.
5. Beams suitably welded at the supporting connection points will sustain a far greater load than similar members carried by standard riveted connections of top and bottom angles.
6. The strength of a welded plate girder is fifty per cent. greater than that of a riveted girder of relative depth, length and weight.

From these results and other tests it is evident that the practicability of electric arc welding for steel frame buildings has been demonstrated without giving rise to any misgivings as to the safety of the new method of joining. The practicability of the field use of arc welding sets is also no longer a matter of speculation, and is to have still further demonstration by the erection of two new steel frame buildings for the Westinghouse Electric Company. One of these buildings is a five-story mill type structure valued at $250,000, to be built at the Westinghouse Sharon Works. The other building on which all steel connections will be welded is a one-story laboratory building at the East Pittsburgh plant of the Westinghouse Company.

At the East Pittsburgh works a steel frame structure has been built by welders of the Westinghouse Company and is pictured herewith. This building, which is to be used as a testing building for direct current high voltage apparatus, is composed of four fourteen-inch H columns, 40 feet high, together with four ten-inch H columns on the opposite side, carrying old roof trusses that have thus been saved from the scrap heap without refabrication. These re-used trusses carry the only rivets in the structure.

Besides the columns above mentioned there are four six-inch H columns at the ends of the building. The roof trusses were placed by spotting gusset plates and anchor plates on the columns to which the truss ends were bolted previous to welding. The crane track is carried on a heavy I beam which is welded to brackets carried on the columns.

During the construction of this building which is to be considered as one of the pioneering attempts to use electric arc welded connections in structural work, a demonstration was given of the ease with which changes in design or errors in fabricating can be accommodated or corrected on the job by the arc welding process. A mistake in cutting the top chord of the false truss was made which would have necessitated the scrapping of this part of the material and the refabrication of the chord if riveting had been the method of joining. Instead of this loss, however, the miscut piece was arc welded into place and the chord was used without loss of strength and with little loss in time. After cutting the roof purlins it was decided that it would be desirable to have the ends of these members project further out over the gable so as to furnish anchorage to the masonry. This change in design was promptly accommodated by welding a section on the end of each purlin with the arc welder, without disturbing the welded connections of some of the purlins to the trusses.

Thus another advantage of the use of the arc weld over riveted connections was brought to light. One of the bug-bears of the contracting business is the delay incident to the refabrication of steel whenever an architect orders a structural change in the design of a building. Such changes can be accommodated in a few hours on the job through the use of an arc welding machine and an able operator.

The chief economy in labor is recognized as pertaining to the elimination of many drawings and templates, and decreases in layout work and assembly work in the fabricating plants. Instead of the punching and cutting of a multitude of accurately laid out angles, bars and shapes for final assembly under the hammers of the riveting gangs, such fabrication as is done in the shops will be done by laying out the material on the floor and fitting and welding it at one operation. It is recognized that the mechanics carrying forward such work will require more skill and ability than is the case now when each piece is laid out separately in the designing room.

The Westinghouse arc welding apparatus handled by the welder at his work consists of a light electric connection clamp into which is fitted a section of wire welding metal at right angles. This entire piece weighs just two pounds and its operation consists of striking an arc by touching the welding wire to the steel at any point where a weld is desired. After striking the arc and fusing the steel at that point the welding wire held in the clamp is drawn slowly along near the joint, welding as it moves. By simply withdrawing the welding wire from the steel and breaking the arc the welding is stopped.

The electric lead wires are simple to arrange and handle, and are much easier to install, extend and move about than an air hose would be. The arc welding process, however, takes practice and skill. In the welding school established at the Westinghouse plant for the purpose of training men in the art of arc welding it is estimated that an expert welder can be trained in six months if a certain gift for mechanical work is present in the attendant.

Bethlehem Stainless Steel and Stainless Iron

(*Continued from page 585*).

than those of machinery steel. The wearing qualities are better than those of both the nonferrous metals and machinery steel, consequently a greater economy results in their use under similar conditions.

Composition

The chromium content of Stainless Steel and Stainless Iron ranges from 11.5 per cent. to 18 per cent., depending upon the purpose for which the metal is to be used. The carbon content for Stainless Steel is above 0.12 per cent. and for Stainless Iron is below 0.12 per cent. The carbon content is the distinguishing difference between Stainless Steel and Stainless Iron, as noted above.

The question as to whether Bethlehem Stainless Steel or Bethlehem Stainless Iron should be used depends entirely upon the hardness required in the finished article. In this connection, it should be noted that Bethlehem Stainless Steel, unlike Bethlehem Stainless Iron, is not corrosion resistant in the annealed condition.

Welding

Bethlehem Stainless Steel or Stainless Iron can be electrically welded by the resistance or butt welding method. After welding, the steel must be annealed and heat treated and the iron annealed to restore the corrosion resisting properties.

Manufacturing Facilities

Stainless Steel and Iron are manufactured by Bethlehem Steel Company at its Tool Steel Plant, Bethlehem, Pa., which operates as a separate and distinct unit. These metals are made in an electric furnace under the supervision of experienced men. After pouring into ingots, the metals pass through the same processes as used in making tool steels, namely: cogging, grinding, rolling, annealing and a thorough inspection.

After careful and extensive experimentation, Bethlehem has developed the correct methods of heat treatment. Adequate equipment is available to properly handle bars and forgings.

While these Alloys as a rule contain an average of about 13 per cent. of Chromium, nevertheless it is at times necessary, depending upon the purpose for which they will be used and the corrosive elements with which they will come in contact or in which they will be immersed, to increase or decrease the amount of this element to obtain the most satisfactory results. Therefore, when requesting information or recommendation, state in detail the purpose for which the metal is to be used, and the name and strength of the acid or other corrosive elements to be in contact with the metal.

Bethlehem metallurgists will be glad to suggest the most suitable grade of Stainless Steel or Stainless Iron applicable to any given conditions.

The G.E.C. "All-Watt" Induction Motor

THE influence of power factor on the cost of generating and distributing electricity is becoming more generally recognised this being largely due to the extensive increase in the number of small induction motors connected to the mains. As a result many supply undertakings have introduced substantial rebates in the form of power factor tariffs, as an incentive to consumers to improve the power factor of their load.

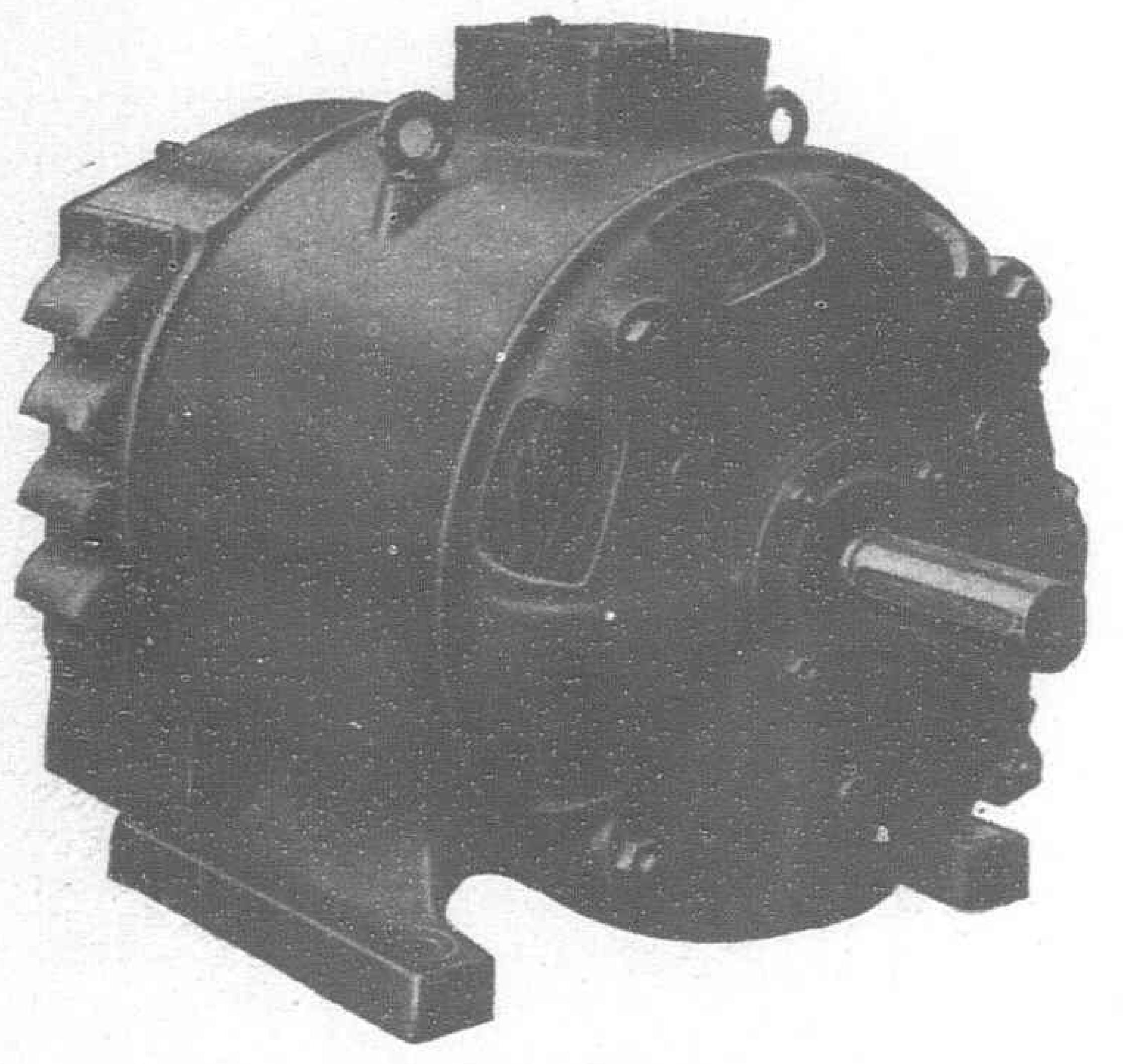


Fig. 1.—G.E.C. "All-Watt" Motor, General View

The application of synchronous motors, condensors, and phase advancers for power factor correction is not a commercial proposition for the small power user. In consequence, there is a considerable demand for the compensated type of induction motor having a high inherent power factor.

In this connection The General Electric Co., Ltd., Magnet House Kingsway, London, England, has recently developed and placed on the market the "Witton" All-Watt compensated induction motor (Figs. 1 and 2) which is manufactured at The Company's-Witton Engineering Works, Birmingham.

The low power factor of an ordinary induction motor is entirely due to the large wattless current it takes from the supply mains. To overcome this feature many attempts have been made to design a motor, capable of generating sufficient wattless current to ensure a power factor of unity. In an ordinary induction motor the line voltage is applied to the stator terminals, whilst the rotor voltage is usually very low.

The "Witton" All-Watt induction motor is so designed that this feature is preserved, thereby possessing many advantages over compensated motors on the market which are provided with brush gear and slip rings, to enable the line voltage to be applied to the rotor. These latter machines have the disadvantage that the functions of the rotating and stationary elements are interchanged. Further, the risk of breakdown due to defective insulation on the rotor is greatly increased.

By adopting entirely new methods the G.E.C. as stated above, has succeeded in developing a motor for the correction of power factor in which only the stator need be connected to the supply, the slip rings, brush gear and rotor windings being subject to a very low voltage. This motor has all the characteristics of the ordinary slip-ring induction motor, with the exception that the power factor over the normal working range is approximately unity.

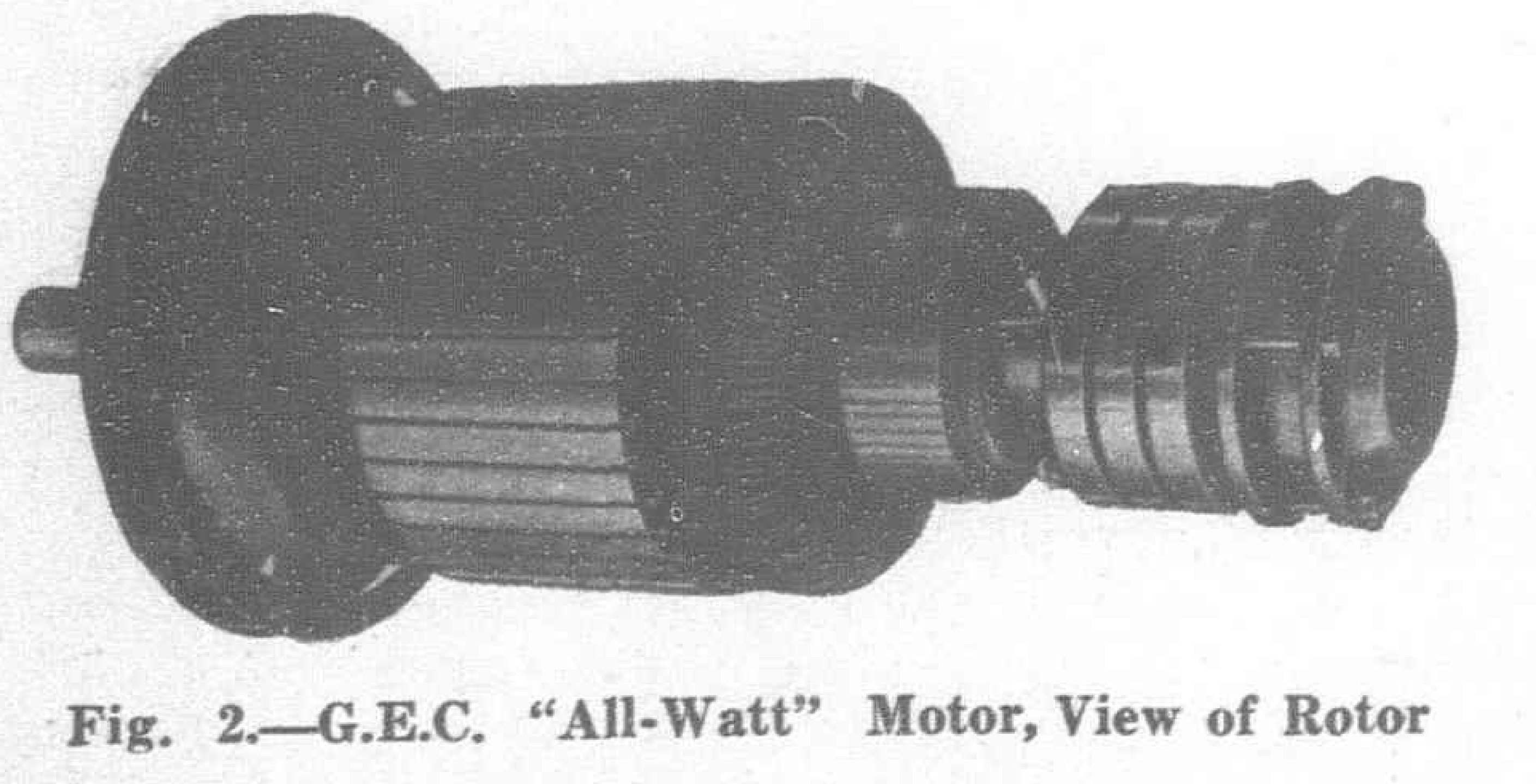


Fig. 2.—G.E.C. "All-Watt" Motor, View of Rotor

This result is obtained by incorporating in the ordinary motor an exciting device, consisting of a commutator connected to a low voltage winding similar to the exciter armature of a synchronous machine, the principle being shown by the diagram of connections in Fig. 3.

Referring to this diagram, the stator "A" rotor winding "B" and slip rings "C" are identical in every way with the corresponding parts of an ordinary induction motor. The rotor can be connected to either the starting resistances "D," or when those have been cut out, to the compensator "E."

The compensator is really a phase advancer built into the machine, and its winding consists of a few turns of wire of heavy gauge.

As this winding is never subject to high voltage, there is no possibility of a breakdown in this connection. In all other respects the construction and operation are the same as with an ordinary induction motor.

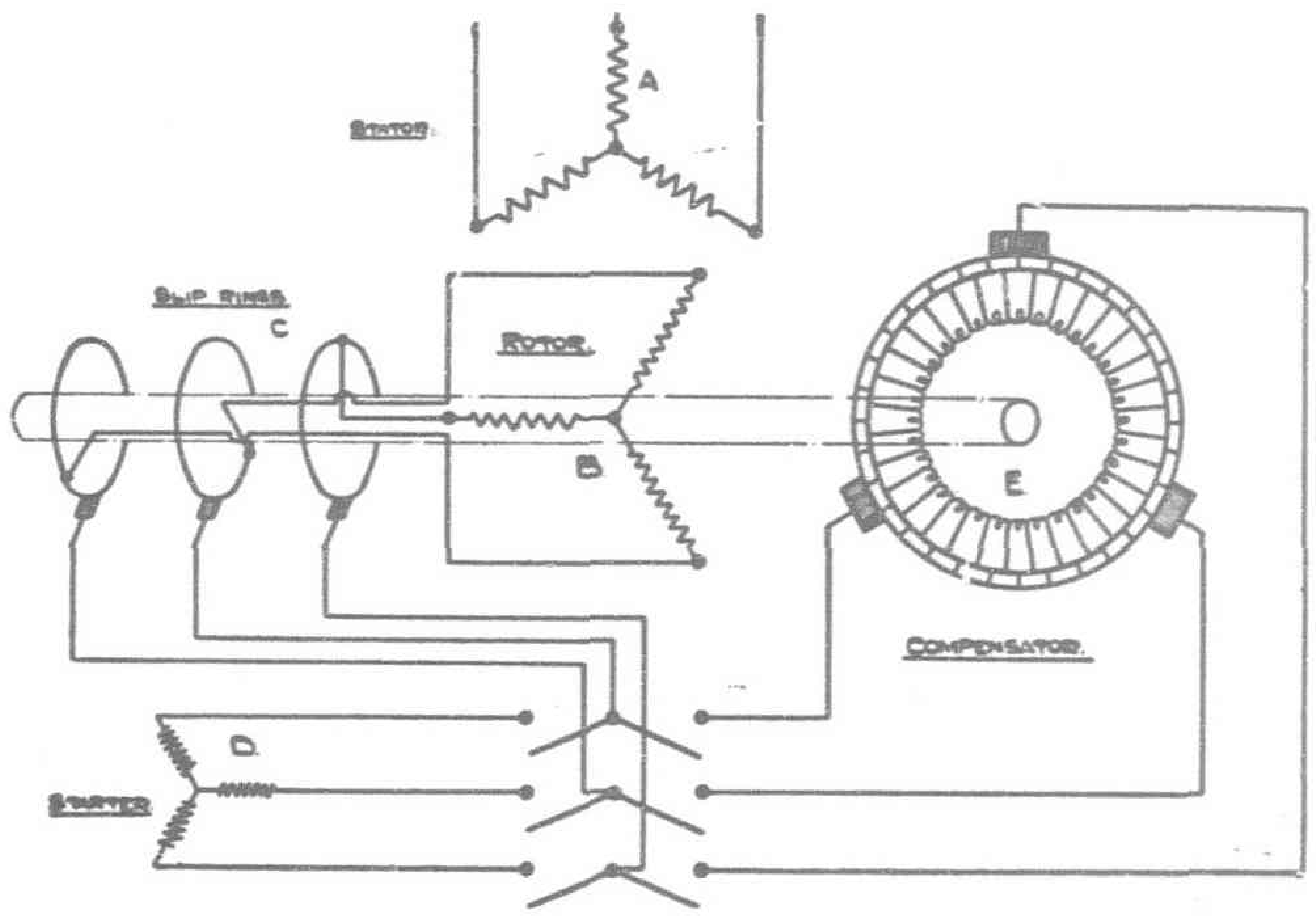


Fig. 3.—Diagram of Connections

The addition of a commutator may appear on first consideration to be a retrograde step. Such commutators, however, will run satisfactorily for long periods without attention, as the voltage on the commutator is very low and sparking is non-existent.

On compensated machines which been previously put on the market, sparking occurred on the commutator during the starting period. This is avoided in the G.E.C. design, as the commutator and exciting winding are disconnected entirely during the starting period.

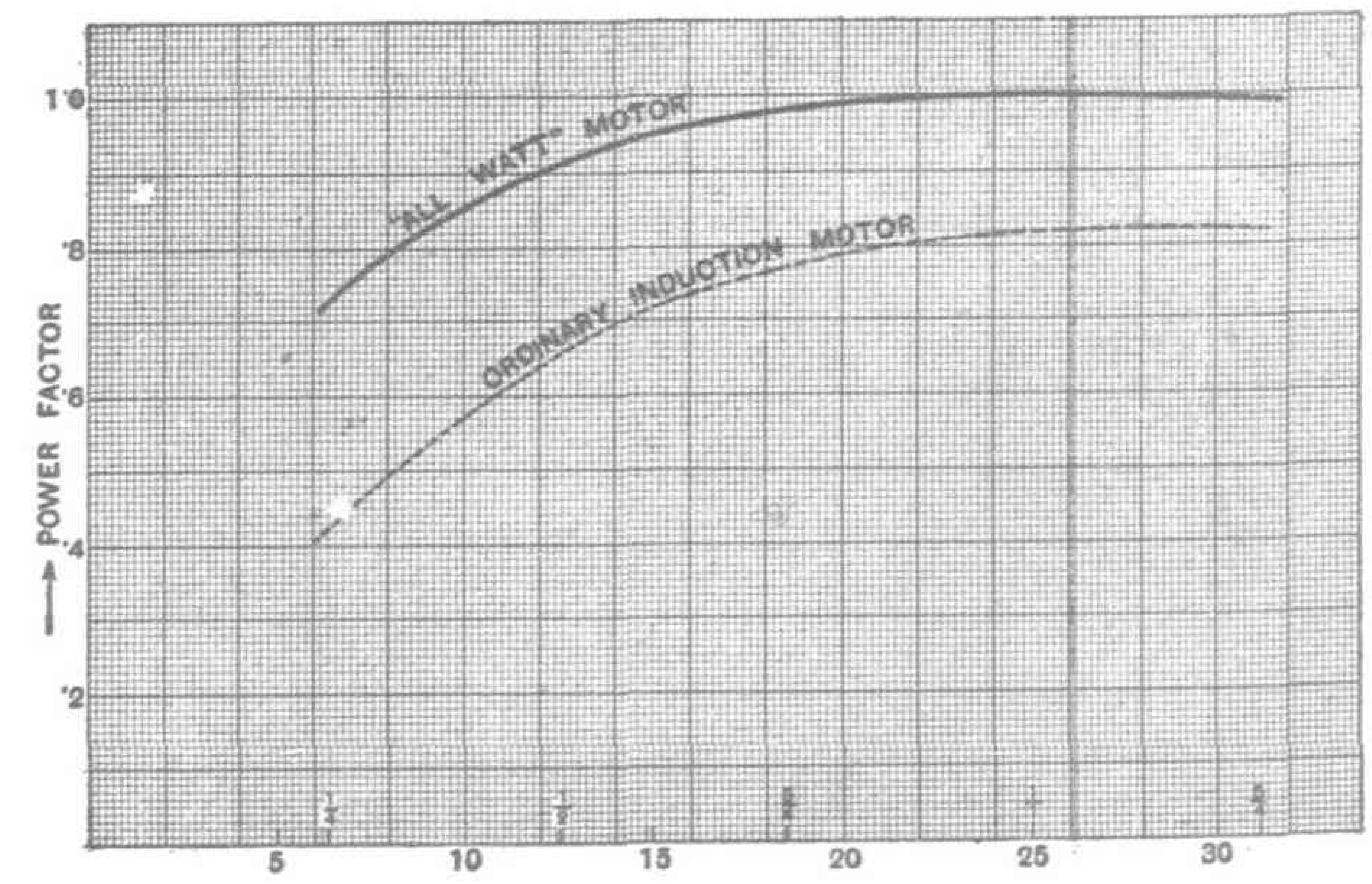


Fig. 4.—Power Factor Curves of G.E.C. "All-Watt" and Ordinary Induction Motors

When the machine has reached full speed, the compensating device and commutator are automatically switched in by moving the starting switch to the final position. The starting of a "Witton" All-Watt induction motor is similar to that of the ordinary type, and does not require any special attention or skill on the part of the operator. The turning of the starting handle will perform the operation in the correct sequence, including the "switching in" of the compensating device on the last step.

As the rotor voltage of an induction motor is very low when the machine is running at normal speed, the compensating winding is therefore never subject to high voltage in G.E.C. machines.

There is a further advantage in having the compensating device disconnected during the starting period, which is not obtainable with any other make of compensated induction motor. The periodicity of the current flowing in the compensating device during the starting period is high, and considerable sparking could take place on the commutator. In the case of the G.E.C. All-Watt Motor as the compensator is disconnected this sparking and the consequent wear of the commutator and brushes are entirely avoided, and no sparking occurs at any time.

When the compensating device is connected in series with the rotor, a magnetising current is sent through the winding sufficient to supply the excitation of the machine. No wattless current will be taken from the line at normal working range between 3/4 load and 25 per cent. overload. On half load, however, a small wattless current is taken from the line, but even under this condition a high power factor is maintained.

The typical curve of a 25 h.p. G.E.C. All-Watt compensated induction motor in Fig. 4 shows corresponding values of power factor of "All-Watt" and ordinary induction motors. The G.E.C. patented compensating device does not in any way interfere with the reliability or simplicity of working of the motor, while the "pull-out" torque is increased. The size of the motor is not increased by the addition of the compensating device, but the cost is slightly higher than that of an ordinary motor of similar output. This increase in cost will, however, be fully balanced by the substantial rebates made by the supply undertakings for improvement in power factor.

The financial saving effected in this manner is clearly indicated by the following comparison of power costs for running (1) an ordinary slip ring induction motor, (2) a G.E.C. "All-Watt motor.

Power tariffs which give advantageous terms for a high power factor vary in different districts and are either on the basis of—

(*a*) A standing charge per k.v.a. maximum demand, plus a charge per unit consumed.

(*b*) A charge per unit consumed, with a rebate for power factor above a certain value.

It will be interesting to compare the power costs for both types of motors when running on these two typical tariffs, and to ascertain how long the compensated motor must run before it repays the user for the higher initial expenditure.

The following data refer to two 25 h.p. motors, each running at 720 r.p.m. on a three phase, 50 cycle system, for a period of 3,500 hours per annum.

The charges for tariff A are taken as £5 per k.v.a., per annum maximum demand plus 0.6d. per k.w. consumed. For tariff B the charges are taken as 1d. per unit with a rebate of 7½ per cent. where the power factor exceeds 0.9.

INDUCTION MOTOR :—

Efficiency 86 per cent. Power Factor 82. Cost £71.
Standing charge on Tariff A=26.5 k.v.a. by £5 =£132
Running ,, ,, ,, =21.7 kw. by 3,500 by 6d.=£190

Total ,, ,, ,, = £322

"ALL-WATT" MOTOR :—

Efficiency 86 per cent. Power Factor 1.0 Cost. £92
Standing charge on Tariff A=21.7 k.v.a. x £5 =£108
Running ,, ,, ,, =21.7 kw. by 3,500 by 6d.=£190

Total ,, ,, ,, = £298.0.0

Hence the annual saving effected by using a G.E.C. "All-Watt" Motor is £24, and since the extra initial cost is £21 this is recovered in 11 months.

The cost of power for each machine, on Tariff B=21.7 k.w. by 3,500 by 1d.=£316.

The "All-Watt" motor will, however, earn a rebate of £23-14 so that it will pay for its extra cost in 11 months as in the case of Tariff A.

The financial saving effected is really larger than that indicated by the above example, when extensions to the electric drive in a factory are under consideration, as the use of "All-Watt" motors generally renders it possible to obtain additional power from the existing generating plant and distribution system.

G.E.C. "All-Watt" motors are capable of developing a high starting torque, and have a large overload capacity combined with other desirable characteristics of the ordinary slip ring induction motor.

New Dutch East Indies Motor Liner

LONDON. September 22. Guests of the Nederland Royal Mail Line had the opportunity at Southampton yesterday of inspecting the largest Dutch motorship afloat, the twin screw *Pieter Corneliszoon Hooft*, with a gross tonnage of 14,642 tons. The vessel left Amsterdam the previous day on her maiden voyage to the East. She is the first passenger motorship that has been added to the fleet of this well-known and popular line. The vessel was laid down on April 23, 1925, at St. Nazaire. She comprises various features which not only make for comfort, but also for the safety of passengers—apart, of course, from the essential changes involved in the substitution of oil for coal fuel.

Thus the most modern davits are used for the life boats, the patent employed having the advantage that if the ship heels over even on one side the lifeboats can easily be lowered by one person by means of a single lever. An installation of wireless telegraphy, commanding a range of 3,000 miles, and including a wireless direction-finding apparatus, a double bottom extending along the whole length, and nine bulkheads dividing the ship into ten water tight compartments, are combined with other technical improvements with a view to making the vessel comply with the highest safety requirements.

The voyage, which has been resumed to-day, is on the ordinary fortnightly service, on which the ship will call at Algiers, Genoa, Port Said, Colombo, and several ports in the Dutch East Indies before reaching Batavia.

As showing one of the great advantages of an oil-burning motor ship, instead of having to take in coals at port of call—which does not add to the pleasure of the passenger, apart from other considerations—sufficient oil can be carried to make both the trip to Batavia and the return trip home. Passengers also benefit, of course, from the additional room provided for them by the reduction of engine room space.

The ship is supplied with two 8-cylinder two-cycle Sulzer—Diesel motors, each driving a screw and developing together 8,000 b.h.p., the fuel being carried in sixteen oil tanks, to the extent of 2,000 tons. An unusual feature is the provision of accommodation for four classes, the fourth class being reserved for natives.

The vessel can carry 671 passengers, and the crew numbers 262. Many of the first and second class cabins are connected by inner doors, for the convenience of families. Generally speaking, the internal scheme combines protection from cold winds with airiness and a discreet lightness of treatment and design. The decoration of the saloons—notably that of the first class dining saloon—is largely reminiscent of the life, at home and broad, of the Dutch poet, scientist, and traveller from whom the ship borrows her name. Muirder Castle, the mediaeval stronghold near Amsterdam where Hooft held office in the early part of the seventeenth century, and other scenes of his travels, figure in tapestries and elsewhere.

A New British India Steamer

ON September 22 Messrs. Barclay Curle & Company, Limited, successfully launched the twin-screw steamer *Rajula*, which they completed to the order of the British India Steam Navigation Company, Limited.

Constructed for the British India Steam Navigation Company's Eastern service, the *Rajula* is 460 feet long by 61 feet 6 inches beam, by 41 feet in depth. The *Rajula* will be equipped with twindeck, four crank, triple expansion engines, served by five single-ended boilers arranged to burn oil or coal as required, and capable of developing a power sufficient to ensure a speed of 14¼ knots.

Accommodation is provided for thirty first class European passengers, thirty second class European passengers, ninety-two native passengers in cabins, and about 3,000 ordinary native passengers. The first and second class public saloons are large and airy apartments, and will be tastefully decorated and furnished to the owners' usual high standard.

Mechanical ventilation is to be installed throughout all first and second class state rooms, and also in the native quarters in the 'tween decks. Large sized hatchways, served by an ample number of winches and derricks are provided to ensure the rapid loading and discharging of cargo.

Engineering Notes

Electrification Feature of New Railways' Plan.—Electrification of various lines is the feature of the new railway plan which is being discussed at the meeting of high officials of the Railway office beginning on October 11 for a few days. The plans for the improvement or reconstruction of lines and stations is also being discussed.

The Railway Office will make an appropriation of Y.100,000,000 for the plans in the next budget. This expenditure will be spread over three years from the next fiscal year.

Tentative plans just now made by the Railway Office are as follows.

On the Tokaido Line :—One goods line on Shinagawa-Tsurumi line will be increased at a cost of Y.4,200,000, to be completed by the end of the next fiscal year. The Shiodome station will be reconstructed at a cost of Y.3,600,000 by the end of 1930. A line will be established along the Tsurumi-Hodogaya line at a cost of Y3,222,000, and will be completed by the end of 1928. The line will also be more increased along the Tamachi-Ueno line. The line from Tokyo to Yokohama will be electrified at a cost of Y.2,932,000. This is to be completed by the end of 1929.

On the Chuo Line :—One line will be increased along the Iidamachi and Nakano line at a cost of Y.5,500,000, being completed by the end of 1928. Kokubunji-Hachioji line, now single track, will be double-tracked at a cost of Y.2,108,000 and be completed by the end of 1931, and the line from Tokyo to Kokubunji will be electrified at a cost of Y.3,881,000 by the end of 1929. The line between Kokubunji and Hachioji will also be electrified by the end of 1929. The cost is estimated at Y.1,145,000. Besides these, approximately Y.492,000 is estimated for the cost of the establishment of each equipment for supplying electric power.

About Y.31,953,000 is estimated for the cost of increase of lines between Tabata and Omiya and several other lines, on the Tohoku line, and the reconstruction of Akibahara and several other stations. All of them will be completed by the end of 1929.

The Oji station on the Joban line will be reconstructed at a cost of Y800,000 by the end of next fiscal year. A line will be newly established between Ryogoku and Ochanomizu on the Sobu line at a cost of Y.8,400,000, to be completed by the end of 1931, and also one line will be increased between Ryogoku and Kameido line on the same line.

Approximately Y.9,060,000, in addition, is appropriated for the cost of new establishment of stations in the neighboring places of Tokyo, and also improvement and reconstruction of Tokyo, Iida-machi, Ryogoku and several other leading stations. These will be all completed by the end of 1930.

Motor Road in Fukien Province.—The motor road between Chuanchow and Yungchun, Fukien province, has been opened to traffic since August 1, the road being 140 *li* in length. The road from Chuanchow to Anhai has been opened to traffic for some time. An extension from Anhai to Tungan for a distance of 80 *li*, is being built by the An Chuan Motor Bus Co. The Chuanchow Loyangkiao road, which has been under construction intermittently for nearly three years, was expected to be opened to traffic on October 1.

Roads in Kwangsi Province.—A section of the Nanning-Tuan Motor Road, between Nanning, capital of Kwangsi province, and Szengenfu has already been built by the provincial government, but the building of the remaining section from Szengenfu to Tuan requires $200,000 which the provincial government cannot yet raise. The magistrate of Tuan, therefore, proposes to raise funds from the public to complete the whole line and to make it a joint enterprise between government and people. A Nanning-Tuan Public Road Bureau is in process of establishment. At the same time a plan is under consideration to build the Nanning-Pashantow road in Yungning district. In order to hasten construction of both lines, it is proposed to start work simultaneously on two sections, one from Shihtzekow to Wutsunhu and the other from Wutsunhu to Pashantow. Funds are to be raised by a land surtax, a business tax and a house tax as well as contributions by government organs and local public bodies. Commandeered labor is to be employed.

Korea Coal Mine Merger Planned.—The proposed merger of anthracite coal mines in Korea is to go through. Representatives of the mine owners met recently in the Korean Government-General. Mr. Yuasa, Administrative Superintendent of Korea was present. Mr. Ikeda, director of the industrial development bureau, submitted a plan for the merger and this was adopted without dissension. According to the plan the company to be established as a result of the merger will be capitalized at Y.10,000,000, divided into 200,000 shares. Of the shares, three-fourths are to be held by the present mine owners in proportions based on an appraisal of the value of mine properties. The remaining one-fourth is to be offered for public subscriptions. Nine members have been nominated by Viscount Saito, Governor-General, to be establishment committee members and the chairman of the committee is to be elected by the chairman of the committee is to be elected by the members. These members are the Mitsui Mining Company, Mitsubishi Steel Works, Nippon Copper Works, Kuhara Mining Company, Korean Anthracite Coal Company, Mr. T. Nishizaki and Mr. T. Fukui. All these companies are promoters. The company is to have the material support of the Government-General.

Japanese Cement Merger.—The proposed establishments of the Asano High-Grade Cement Company by Mr. Soichiro Asano and the Nanao Portland Cement Company by the Iwaki Cement interest are beginning to be discussed by cement companies belonging to the Japan Cement Association. A general meeting of the association will be held in Osaka toward the latter part of September, when the matter is to be taken up for discussion.

According to the association, these two companies are planning to increase cement production of the pretext of the incorporation of new plants, it is reported. Representatives of the association, excepting those of the two firms, recently met and decided that these firms will be advised to drop their plans, as otherwise they will be excluded from the association. There are now 19 companies belonging to the association. Both firms have much influence in cement circles and their exclusion, if realized, might cause the dissolution of the cement association. There are wirepullers behind the scenes who are attempting to dissolve the association and carry out free production during October, November and December, the the most active season of the year.

Glass Factories in Harbin.—Four glass factories are operating in Harbin, but only on a limited scale ; the Ping Kiang Glass Factory the Yuan Chi Glass Factory, the Cheng Tai Glass Factory and the Sin Hsing Glass Factory. The products of these establishments consist entirely of glass wares such as cups, bottles and lamp chimneys, no plate glass being manufactured.

Waterworks in Pakhio (Kwangtung).—The Pakhio Waterworks Company was organised in 1925 with a capital of $50,000. 5,000 shares, valued at $10, are being issued, and four wells have already been dug. It is proposed to erect one or more large tanks from which water will be distributed throughout the city, and it is expected that the work will soon be completed.

New Ironworks Established in Hangchow.—The growing prosperity of the silk weaving industry in Hangchow has created an ever increasing demand for weaving machinery and accessories such as power looms, silk-twisting machines, silk-winding machines, Vincenze machines, steel reeds, etc. Some are imported from abroad, others come from Shanghai, but the greater portion is now manufactured by local ironworks, principally by Wu Lin, Hangchow and Ta Yeh. As the output of the existing iron works is far from sufficient to meet the growing demand, however, three new works have started operations this year, namely, the Chekiang Metal Reeds Factory at Puankai in January, with Ting Teh-pei as manager ; the Hu Lin Ironworks at Tafuchinghsiang, Lienchiao in May, with Yang Yun-fu as manager ; and the Ta Tung Ironworks in October, under the management of Wu Yu-fen. These new ironworks are engaged in the manufacture and repair of silk weaving machinery.

The Largest Hosiery Factory in Foochow.—With the close of the Ho Chun Hwa Kee Hosiery Factory, a Japanese concern, the Chi Sin Hosiery Factory is now the largest enterprise of this description in Foochow. It was founded in 1916 with a capital of 50,000 dollars. There are six machines for manufacturing hose, operated with electric power, and two hand machines. One worker manages two machines, each run by a 1 h.p. motor. In addition, there are two hosiery sewing machines, one ordinary sewing machine, and one 12-spindle cotton-yarn reeling machine, all ordered from America. There are also three scarf-making machines, manufactured by Chinese ironworks in Shanghai, each producing two dozen scarfs in 10 hours, one machine for making woollen sweaters, producing half-a-dozen sweaters every 10 hours, and several dozen knitting machines. The factory produces 18 dozen pairs of hose a day and consumes 13 units of electricity at 15 cents per unit. The workmen are paid 60 copper cents and the women workers more than 20 copper cents per day. The apprentices number over 40.

Waterworks in Kirin City.—Funds are being raised for the installation of waterworks in Kirin city. The present water supply of the population is derived from the Sungari River and is not considered satisfactory. Preparations are under official auspices.

China Enamelling Tungkee Co., Ltd., Shanghai.—The China Enamelling Tungkee Co., Ltd., 103 J. Avenue Joffre, French Concession, Shanghai, is the new style of an old company known as the China Enamelling Co. The chop "Tungkee" will still be used. The company manufactures wash basins, lunch carriers, cooking pots, rice bowls, mugs, covered mugs, buckets, cuspidors, hat lamp shades and also takes orders for enamelled signs, number plates for houses, rooms, or vehicles and various kinds of enamelled decorators. The trade-mark is translated as "Three Diamonds" or "Three Squares." Its gross annual business is claimed to be $200,000. Capital is $100,000, of which $50,000 unpaid is now being called up.

Roads in Hainan.—The work of road construction throughout the island has made great progress during the year. There are now open to motor traffic three main roads: Hoihow-Lamko (231 *li*), Kiungchow-Wenchang (127 *li*), and Kiungchow-Lungkuan (328 *li*), and in addition to these there are many small roads constructed or in course of construction. There are at present 25 motor-car companies on the island operating 130 motor-cars running on 1,500 *li* of motor roads. Last year only 11 motor-cars existed on the island. The preservation of the roads rests with the motor-car companies. The increase in motor traffic explains the large increase in gasolene imported. It is hoped that the work of road construction will not be neglected in the future and the plan for a road round the island will be pursued. Simultaneously with this work, the question of the improvement of the Hoihow harbor should be taken up, as the harbor is silting up year after year and the shipment and discharge of cargo is becoming increasingly difficult. The interior of the island is rich in mines and virgin forests, and before an attempt is made to exploit them the present harbor conditions must be improved. The removal of the port to another part of the island, which has been suggested more than once before, is not feasible, especially for economic reasons.—*Kiungchow Customs Report, 1925.*

Manufacture of Shoe Polish in Shanghai.—The Tung Chemical Works, 121 Ward Road, Shanghai, has opened a new department for the manufacture of shoe polish. It is in three colors, black, yellow and brown, all trade-marked "Eight Diagram." The company was established in Novemeber, 1924. "Eight Diagram" Liquid Metal Polish was put on the market in 1925. On account of the demand for native metal polish and the growth of the business, $10,000 was added to the capital, and a new brand was manufactured under the trade-mark, "Three Swallows in May, 1925. Daily production is 500 dozens of shoe polish and 90 dozens of metal polish. The wholesale prices of "Three Swallows" is $5.40 per three dozen, of "Eight Diagram," $4.80 per three dozen and of all kinds of 'Eight Diagram" shoe polish, $6.50 per 12 dozen. The market prices of the "Three Swallows" is $0.20 per tin, the "Eight Diagram," $0.18 per tin and all kinds of shoe polish, $0.10 per cake. The proprietor is Tung Jung Ch'ing and the manager, Hsu Kan Chuan.

Japanese Shipping Profits.—The Nippon Yusen Kaisha, Japan's leading shipping company, made net profit in the half-year ended March 31 of 2,684,236 yen. This represents a considerable improvement on the preceding half-year, when profit was only 1,157,531 yen. It enables the company to pay a dividend of 8 per cent (requiring 2,320,000 yen) and to place 140,000 yen to the legal reserve, as well as to increase the credit forward from 174,651 yen to 318,886 yen. Six months ago, when the dividend was also 8 per cent, it was necessary to draw upon the dividend equalisation fund to extent of 1,300,000 yen. On that occasion the company took from reserves 17,000,000 yen for the purpose of writing down the book value of the fleet, which now stands at 57,081,169 yen.

The company still possesses large reserves, the total, inclusive of insurance and structural repair funds, being 42,783,975 yen, against a paid-up capital of 58,000,000 yen.

Harbor at Macao.—Work on the new outer harbor at Macao has progressed most actively during the year, and hopes are entertained of its completion by the end of 1926. The encircling breakwaters, of an aggregate length of 2,700 metres, are either completed or in full course of construction; the foreshore reclaimed, with retaining walls some 3,000 metres long, will cover an area of about 175 acres, and space for the erection of godowns, the rapid and easy handling of cargo, and provision of all the many needs of a busy port will thus be conveniently available; the channel leading to the open sea is being effectively protected against silt, and preliminary dredging of the harbor to a depth of 12 feet at low water of spring tides have been effected, steamers bringing supplies and drawing 20 feet or so have already anchored and worked within its limits. In connection with the general plan a dry dock for tugs and steam-lunches has recently been opened and an excellent and spacious typhoon anchorage for river steamers and junks is now provided near the existing inner harbor. Here, also, an extensive area has been reclaimed, and this land is being rapidly taken up for industrial purposes. Indeed, new life is being infused into her commercial activities by Macao's manifest will to prosper and her known desire to achieve this end by the operation of her new harbor scheme.—*Lappa Customs Report, 1925.*

Ice Factories in Soochow.—There are two ice factories in Soochow, the Kung Hsing Ice Factory and the Tien Wu Ice Factory. The former was established ten years ago, and the latter five years ago. Both factories are located outside Hsi Men, Soochow city. According to the factories, not one in a thousand homes keeps an ice refrigerator to preserve food. The largest consumers of ice in the district therefore are the restaurants. The number of restaurants in Soochow is large, and so many quantities of ice are in use daily. The factories in Soochow do not manufacture ice; all they do is to preserve natural ice. Each of the two factories owns some 50 *mow* of land. This land is leased to farmers nearby who plant rice, vegetables, etc. In late autumn and winter, laborers from the factories pump water on to the land and the process is repeated until the end of the cold weather. The ice carriers receive a bamboo tally for each journey to the factory. In the evening, the laborers produce their tallies and are paid in cash at the rate of 30 cash a tally. An average day's work is the carrying of 20 loads of ice a day. Thus, the laborer receives 600 cash.

When the ice is taken to the factory, it is broken into small pieces. The breaking is done by women. The work is fairly rapid and requires the services of strong women. Wages are calculated according to the quantity of ice broken. Five per cent. of the price of the ice delivered to the factory is given to the women laborers, who divide the money among themselves. If the total quantity of ice stored in a single day is 500 piculs, the total value of the ice would be $400. Five per cent. of the total sum is $20. Divided by ten, the number of women employed, this works out at 20 silver cents a day.

The factories are roughly constructed of rice straw and mud. The walls consist of mud mixed with particles of brick. They are about two feet thick, and, both the outside and the interior are lined with reed matting, specially woven for the purpose. Many layers of stalks cover the roof, which is about a foot thick, and very high. The interior is sealed effectively from sunlight and air, and workers have therefore to use electric lamps in unloading their ice blocks, which are also covered with thick layers of rice stalks.

Ice is sold at 80 silver cents a picul; and about 27,000 piculs are consumed annually.

Hwa Ming Matting Factory at Yuyao, Chekiang.—The Hwa Ming Rush Matting Factory, outside the North Gate of Yuyao, Chekiang province, was started in 1919 and has been registered with the Ministry of Agriculture and Commerce. Its present capital is $50,000. The factory is equipped with 150 sets of wooden machines of the improved type, of which about 40 per cent are of the "double" type, enabling two weavers sitting at opposite sides to work simultaneously. All the weavers are women and girls. At present only about 120 machines are in operation, shortage of labor having compelled the factory to limit its working scope. The matting is woven with cotton thread as warp and a kind of rush called "pu" as woof. The thread is obtained from the Hung Yu Cotton Mill in Shanghai at $300 a bale and the rushes from the Ningpo farmers at $10 a picul. The object of the factory is to produce matting to replace the Japanese manufacture on the Chinese market, as Japan imports certain quantities of the same kind into this country every year. The Japanese manufacturers also obtain raw material from the Ningpo farmers. About 100,000 pieces of matting of different types including those for cushions, beds, and table covers are produced by the factory every year, most of them being decorated with printed figures. Owing to competition with the Japanese kind, the factory's matting is sold at very low prices. A piece of bed matting, 3 feet 4 inches, Chinese measure, by 5 feet, is sold at only a dollar or so. The product is consumed mostly in Chekiang and Kiangsu. It is exported in big wooden cases, each containing from 200 to 1,000 pieces according to size of matting. It is exempt from likin duty in Chekiang province. Over 100 weavers are now working in the factory. Their wages are exceedingly low. A skilled hand capable of turning out a piece 3 by 5 feet a day earns only 30 coppers including food, a less skilled hand gets only 10 cents, small money, while a raw beginner receives scarcely enough allowance for her daily food. The weavers work ten hours a day. This is why the factory cannot get enough hands to work its own machines. In spite of the low wages, the factory is still losing money, because its product is sold too cheap. On the home market, the factory's product has become a formidable rival to the Japanese manufacture, of which the import figure has shown a marked decrease recently.

Long Distance Telephones in Chekiang.—The charge for long distance telephone service in Chekiang province has been raised from 25 per cent. to 50 per cent. according to distance.

Hua Feng Cotton Spinning and Weaving Company.—A total of Tls. 1,513,440 is being raised as new capital by the Hua Feng Cotton Spinning and Weaving Co., Ltd., 55 Szechuen Road, Shanghai. The new capital is needed partly for paying debts and partly for running expenses. As an inducement to new capital, and because of over-valuation of its mechanical equipment to the extent of Tls. 852,000, the total assets of the company valued at Tls. 1,216,400 will be discounted and reduced to Tls. 851,480. The company was capitalised at Tls. 2,000,000, and the paid up capital was Tls. 1,210,000. The company has its factory in Weng Tsao Pang, Woosung, covering 128.30 *mow* of land. It has 25,000 spindles and produces 50 bales weighing 420 pounds each every day. Its workers number 2,000. Its trademark is "Cannon". The company was established in 1920. Its present manager is Tsui Ch'ing-chi.

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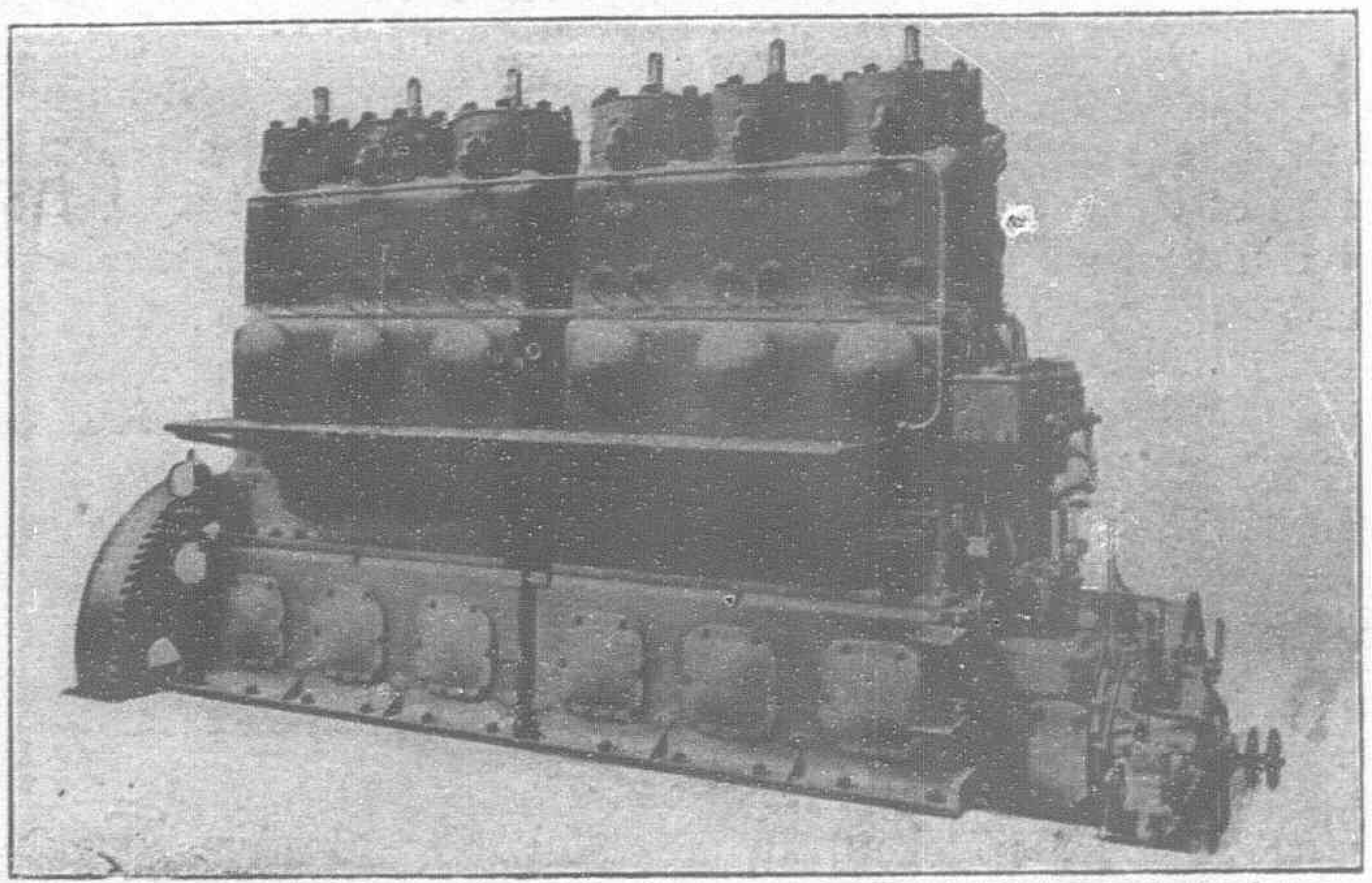

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